October 14, 1946

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 69

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OCT 14 1946
DETROIT

TECHNOLOGY DEPT!

The Iron Counterpart of Famous Steel Rolls

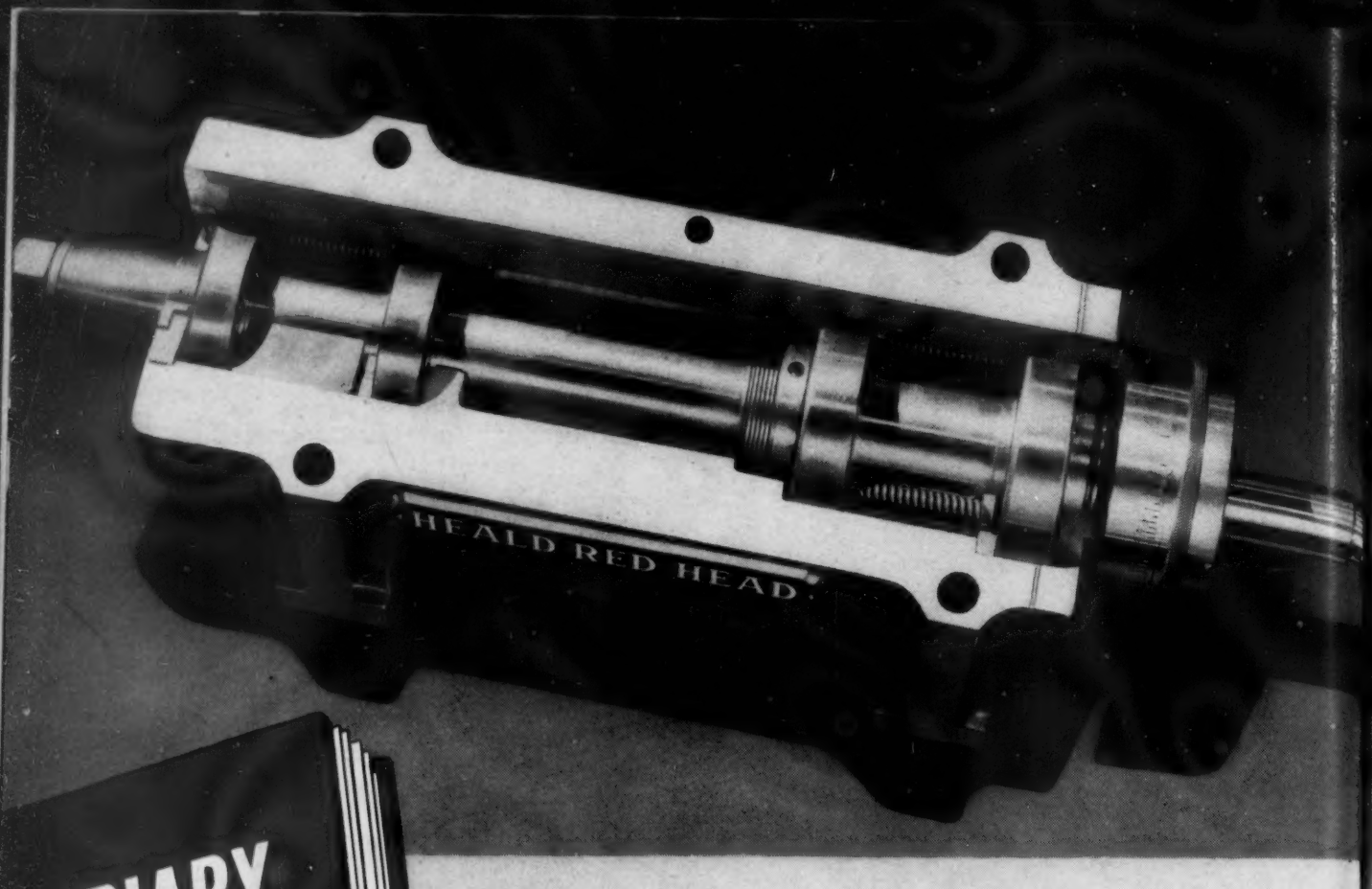
On performance—the continued satisfaction of *Steel* Roll customers—Ohio built a reputation. Now Ohio *Iron* Rolls are being produced by the same kind of modern methods, embodying the same sound brand of Ohio experience and meeting the same exacting standards of excellence which have always been the basis of Ohio Steel Roll production.

Select from any of these 9 types of Ohio Steel and Iron Rolls: Carbon Steel Rolls, Ohioloy Rolls, Ohioloy "K" Rolls, HOLL-O-CAST Rolls, Chilled Iron Rolls, Dense Iron Rolls, Nickel Grain Rolls, Nioloy Rolls, Flintuff Rolls.

Ohio Rolls

THE OHIO STEEL FOUNDRY COMPANY
LIMA, OHIO • *Plants in Lima and Springfield, Ohio*

ENGINEERS
FOUNDERS
MACHINISTS



DIARY OF A FAMOUS RED HEAD

BORN

"Red Head" Boringheads and Wheelheads were conceived in the Heald engineering rooms, after many years of experiment by top specialists in machine tool design. The "Red Head" had to be self-adjusting . . . it had to be dependable and foolproof . . . and it had to deliver the very finest in precision finishing. Result: a rugged, serviceable head, soundly constructed and adaptable to every requirement in internal grinding and borizing operations.

VITAL STATISTICS

Cutaway view above illustrates some of the exclusive features of "Red Head" design. Spindle bearings are of the angular contact type, assembled under definite spring preloading which automatically compensates for temperature expansion or contraction and wear. Oil flow to the bearings is regulated by individual felt wicks. Close-fitting baffles exclude dirt and water.

SERVICE RECORDS

The Heald "Red Head" has earned a reputation for doing its job—whether it be high speed operation rotating grinding wheels or tools, or carrying heavy work fixtures—with a minimum of maintenance and with the utmost in precision efficiency. Here are some actual "Red Head" service records from our files:

- **22,000 hours' service—in production 24 hours a day.**
- **6 years' production—no bearing replacements or repairs.**
- **24-hours-a-day production for 3 years maintaining perfect condition.**
- **8⅓ years' operation—36,420 hours' service.**
- **In continuous operation for 10 years—still using the original boringhead bearings.**
- **32 Bore-Matics with over 100 Heads in one plant—only one required bearing change.**
- **45 Bore-Matics in another plant—some in continuous operation for 8 years without boringhead trouble.**

Records like these, common among "Red Head"-equipped Heald machines, result in quicker set-ups, fewer delays, less down time—factors that may well mean the difference between profit and loss in your machining work. Whatever the size of your shop or the scope of your work, chances are that the "Red Head" and the men who designed it can help to give you faster, more economical production. For further information, write: THE HEALD MACHINE COMPANY, Worcester 6, Mass.

HEALD

means more precision

. . . less cost

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

Manufacturer of Milk Cans

These sections, formed of heavy-gage steel strip, are Bethlehem Cold-Formed Shapes, which we've long been supplying to a manufacturer of milk cans. In this use, Cold-Formed Shapes meet the need for a smooth, attractive surface which, when tinned, is easy to keep clean and sanitary.

Milk-can sections are just one example of the way Bethlehem Cold-Formed Shapes find uses in many different kinds of products.

Where precision-forming and surface finish are factors . . . where hot-rolling is uneconomical or impractical . . . where there are large or recurring runs . . . there are real advantages in using these sections.

Bethlehem Cold-Formed Shapes are produced on presses, brakes, or rolls. There's virtually no limit to the types of cold-formed shapes Bethlehem can supply, in a broad range of sizes, gages and lengths.

Tell us about your problem. And send for illustrated booklet on Bethlehem Cold-Formed Shapes. Address your request to Bethlehem, Pa., or to the nearest Bethlehem Steel office.

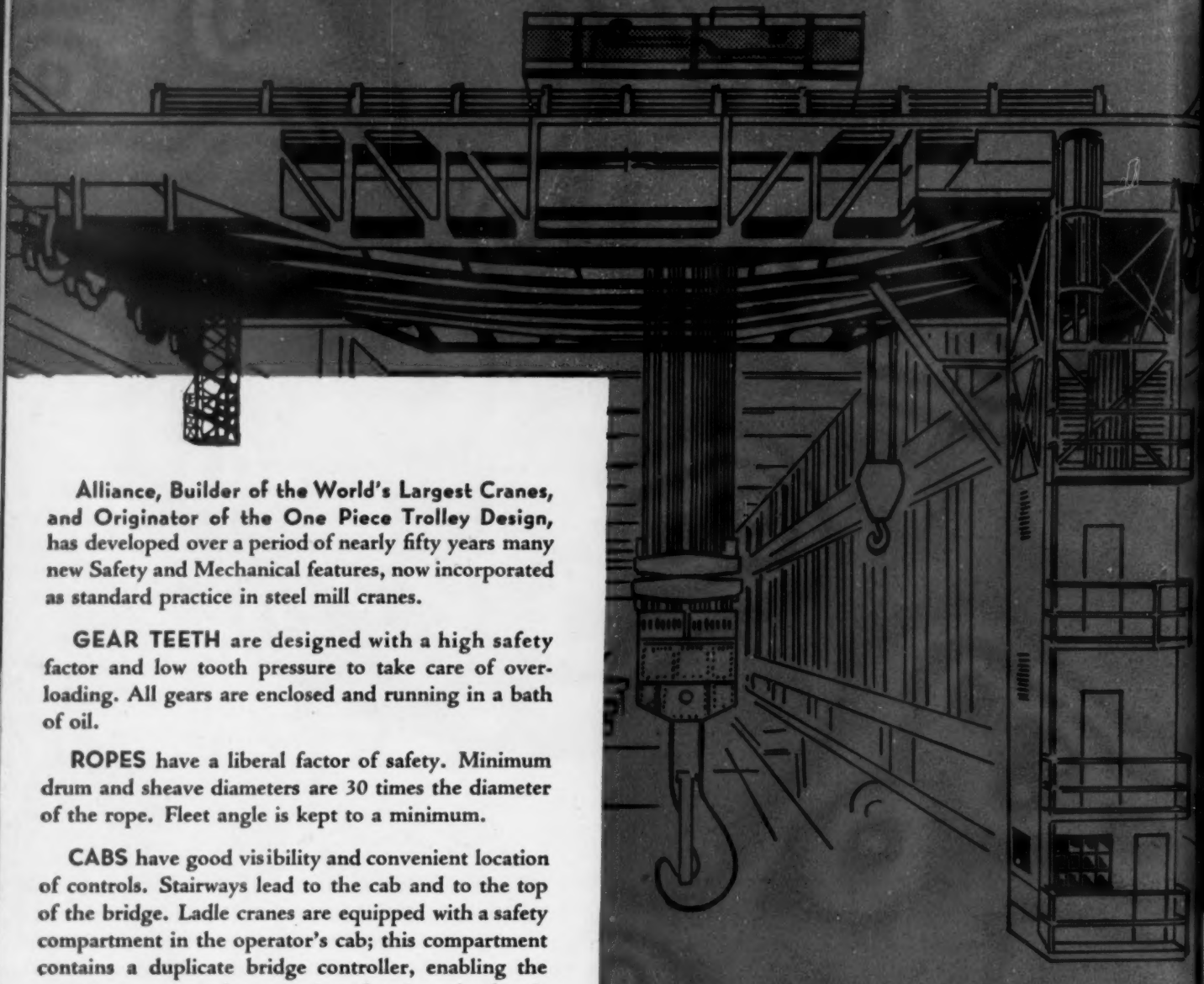
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

★ BETHLEHEM STEEL ★

Alliance Builds Cranes

BIGGER and BETTER



Alliance, Builder of the World's Largest Cranes, and Originator of the One Piece Trolley Design, has developed over a period of nearly fifty years many new Safety and Mechanical features, now incorporated as standard practice in steel mill cranes.

GEAR TEETH are designed with a high safety factor and low tooth pressure to take care of overloading. All gears are enclosed and running in a bath of oil.

ROPES have a liberal factor of safety. Minimum drum and sheave diameters are 30 times the diameter of the rope. Fleet angle is kept to a minimum.

CABS have good visibility and convenient location of controls. Stairways lead to the cab and to the top of the bridge. Ladle cranes are equipped with a safety compartment in the operator's cab; this compartment contains a duplicate bridge controller, enabling the operator to move the crane in safety in case of accidental spilling of hot metal.

FOUR MAIN HOISTING ROPES, not one, carry the load on Alliance Ladle Cranes. This patented safety rope reeving combined with another Alliance development, (the laminated plate ladle hook), make up a safety team that is the acknowledged *tops* for safe handling of hot metal.

Rely on Alliance for

LADLE CRANES · GANTRY CRANES · FORGING MANIPULATO
SOAKING PIT CRANES · OPEN HEARTH CHARGING MACHIN
STRIPPER CRANES · SLAB AND BILLET CHARGING MACHIN
SPECIAL MILL MACHINERY · STRUCTURAL FABRICATI

THE ALLIANCE MACHINE COMPANY
ALLIANCE, OHIO
1622 OLIVER BLDG. · · PITTSBURGH, PA.

Alliance

Take a look at what can't be seen

Margo Black, *J & H Associate Plant No. 4*

Even a flat wheel on a streamliner isn't as bad as an odd-sized ball in a ball bearing. That ball wears too fast, increases friction, leads to break-downs and needless cost. But no one could see or measure rapidly the fraction of an inch that would make that costly difference. So Jack & Heintz found a way. They developed an electronic ball sorter that separates balls automatically into 10 groups, the diameter of each group graded to an accuracy of *ten millionths of an inch* . . . and it does this *8 times as fast* as conventional equipment.

That's why Jack & Heintz ball bearings will last longer, hold friction at the minimum, reduce cost, keep shafts turning longer. These are all typical results of the Jack & Heintz *Mass Precision* technique that is being applied today not only to ball bearings but also to electric motors, compressors, aircraft accessories, electronic gauges and Eisemann magnetos. And tomorrow this same Jack & Heintz *Mass Precision* will bring other important developments that will make equally startling savings in industry and homes.

JACK & HEINTZ PRECISION INDUSTRIES, INC.

CLEVELAND 1, OHIO

Behind the Scenes...

Machining Stainless

On account of the tremendous amount of interest now being shown in stainless steels, the current series of three articles on machining stainless is particularly timely. It's a good job, done by a man who knows his stuff, and some of his pointers may save you a lot of production headaches if you're doing or thinking about doing some machining jobs on stainless. We have a few extra copies of this series, which winds up in this issue, and if you'd like one or more, drop us a line. We'll be glad to shoot them out as long as the supply lasts.

Vanishing Americans

From the "Wright Line" we pick up a story about the people who get up earlier than anybody else in this country, as a class—the New England farmers. Seems that in a small village store in New Hampshire two of the local farmers were bragging. Each claimed that he was the earliest riser in the neighborhood. That night, one of these two early-worners decided that he'd get up at 3 ayemm the following morning. His rival, having learned of this decision, thought he might catch the first early bird in bed. So, at 2 o'clock, he arose and called at his friend's house. "Where's Jim?" he asked his rival's wife.

"I dunno," she answered, showing no surprise. "He was around here earlier in the morning!"

Modern Cure-All

Progress at times tends to be somewhat confusing. Like, for example, the recent story we read out of New York which tells about a new gadget soon to be on the market. It's the modern counterpart of the patent medicine of past years, wildly guaranteed to cure all for a small cash outlay. These days, however, it isn't necessary to imbibe snake oil or Dr. Winterbottom's Pepto-Reznol. All you do is approach this new machine, drop a quarter in the slot, and it gives with the diathermy for five minutes. Brings light into your life and spring into your arches, no doubt.

Poetry Corner

In common with everyone else in this country, we decided to break down and recognize the meat shortage in print. All the old gags have been dug up, dusted off, and you can win almost any amount of money by betting that any given comedian will refer to the situation on his radio show no less than 5 times per half hour. Since all the old chestnuts have been well roasted, we've decided to revert into poetry, especially since we have before us a pome sent in by that old school bard, Anon. J. Fenimore Anon, that is. We've taken a few liberties with his iambic pentameter, and it comes out something like this:

The nation's in a meatless stew,
The situation's pond'rous.
"OPA's a witches' brew"
Cries farmer, press and Congress.

If the kind of food your kitchen's giving
Brings on a spinal shiver,
Remember that if life's worth living,
It depends upon the liver.

But who can get even liver these days?

Protection Data

For those of you readers who have problems in finishing or corrosion-proofing ferrous metals, take a look at the report on a recent symposium held here in Cleveland covering those subjects. It's in this issue, prepared by our eminent expert on metal finishes and contributing editor, Dr. Gray. He knows what he's talking about, and you may pick up some money-saving pointers from his report.

Our Own Lena

Back in the not too far distant days when this stint had this whole page to itself, we used to run upon occasion some small line drawings, more or less pertaining to the subject matter of the particular paragraph in which they appeared. We must confess that we never valued too highly the aesthetic values of those pieces, but it appears that we were sadly lax in our judgment, for the artist has been acclaimed by better judges than ourselves. Yep, he's risen to prominence in the world of art, and his most recent opus has been accepted and will be hung in the Museum of Modern Art, no less, in New York. He's Pat Dwyer, of our own art department, who has done this. And the opus? It's a prize-winning canvas, which took second place in the local Lena the Hyena contest and we promise that as soon as we can make the necessary arrangements we'll have Lena(ugh!) right here in these here now colyumes.

Shrdlu

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STEEL

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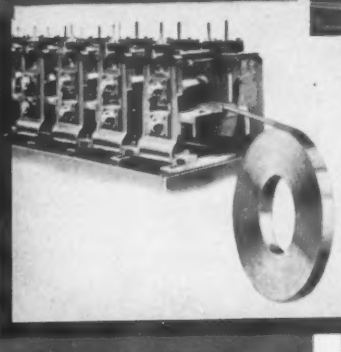
Editorial Staff on Contents Page

Why SHARON STAINLESS *Fabricates Easier*

DEEP DRAWING

BENDING

WELDING



ROLLING

POLISHING

Stainless steels are precisely made. Their fabrication requires more careful planning and control than ordinary metals.

In the case of Sharon Stainless, we can say "It's easier to fabricate." Here's why. Sharon's metallurgical staff not only supervises closely the production of Sharon Stainless, but also works with users in selecting the proper grade and in advising as to fabrication methods.

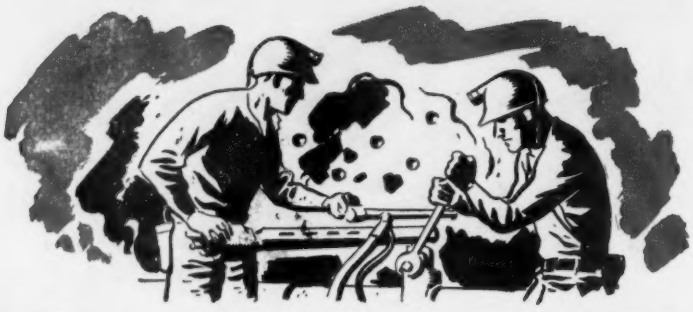
Fabricators have fewer production difficulties when they consult Sharon's stainless steel specialists whose energies are devoted untiringly to finding the correct solution to countless problems of the metal-working industry.

SHARON STEEL CORPORATION
Sharon, Pennsylvania

Subsidiaries: NILES ROLLING MILL COMPANY, Niles, Ohio
DETROIT SEAMLESS STEEL TUBES COMPANY, Detroit, Michigan

District Offices: Chicago, Ill., Cincinnati, O., Cleveland, O., Dayton, O., Detroit, Mich., Indianapolis, Ind., Los Angeles, Calif., New York, N. Y., Philadelphia, Pa., Rochester, N. Y., St. Louis, Mo., San Francisco, Calif., Montreal, Que., Toronto, Ont.

SHARONSTEEL



METAL INDUSTRY

Served by

UNION PACIFIC

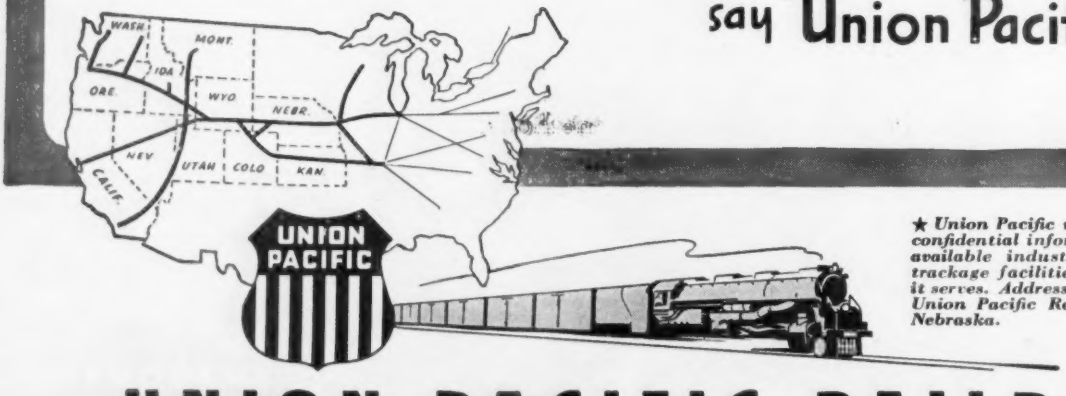
Your industry is one of hundreds served by Union Pacific. Every shipper is assured of efficient, dependable transportation when materials or merchandise are earmarked for the Strategic Middle Route, uniting the East with the Midwest, Intermountain, and Pacific Coast States.

Union Pacific provides specifically designed cars, various services and departments, to assure **proper** handling of a wide diversity of products.

Union Pacific's facilities and equipment are ready to meet the heaviest needs of commerce. Traffic experts are stationed from coast-to-coast. They will help you with that *next* shipment—and every shipment.

For dependable, fast freight service always . . .

be Specific –
say "Union Pacific"



★ *Union Pacific will gladly furnish confidential information regarding available industrial sites having trackage facilities in the territory it serves. Address Industrial Dept., Union Pacific Railroad, Omaha 2, Nebraska.*

UNION PACIFIC RAILROAD

The Strategic Middle Route

IN WIND, RAIN, SNOW OR HAIL • YOUR FREIGHT GETS THERE BY RAIL!

Out beyond the overhead!

FIXED overhead construction and track layouts do not lend themselves to expansion problems—and if they did, expansion would be costly.

You can supplement your present equipment, speed up loading and unloading and make space now wasted just as usable as any other part of your plant or yard.

Your Northwest crawler equipment goes anywhere, loads any type of car or conveyance, handles any kind of material. It will travel up or down ramps on the loading dock and it will handle loads to overhead doors or decks.

In the storeyard it negotiates aisles and handles stacking with heavy loads. Where this is not a full-time operation, it can be routed to other work at the power plant handling coal or ashes.

One-man operation and low fuel consumption plus easy upkeep. It brings about distinct savings over steam equipment. With it firing and water troubles, and operating costs cease when you shut the engine off.

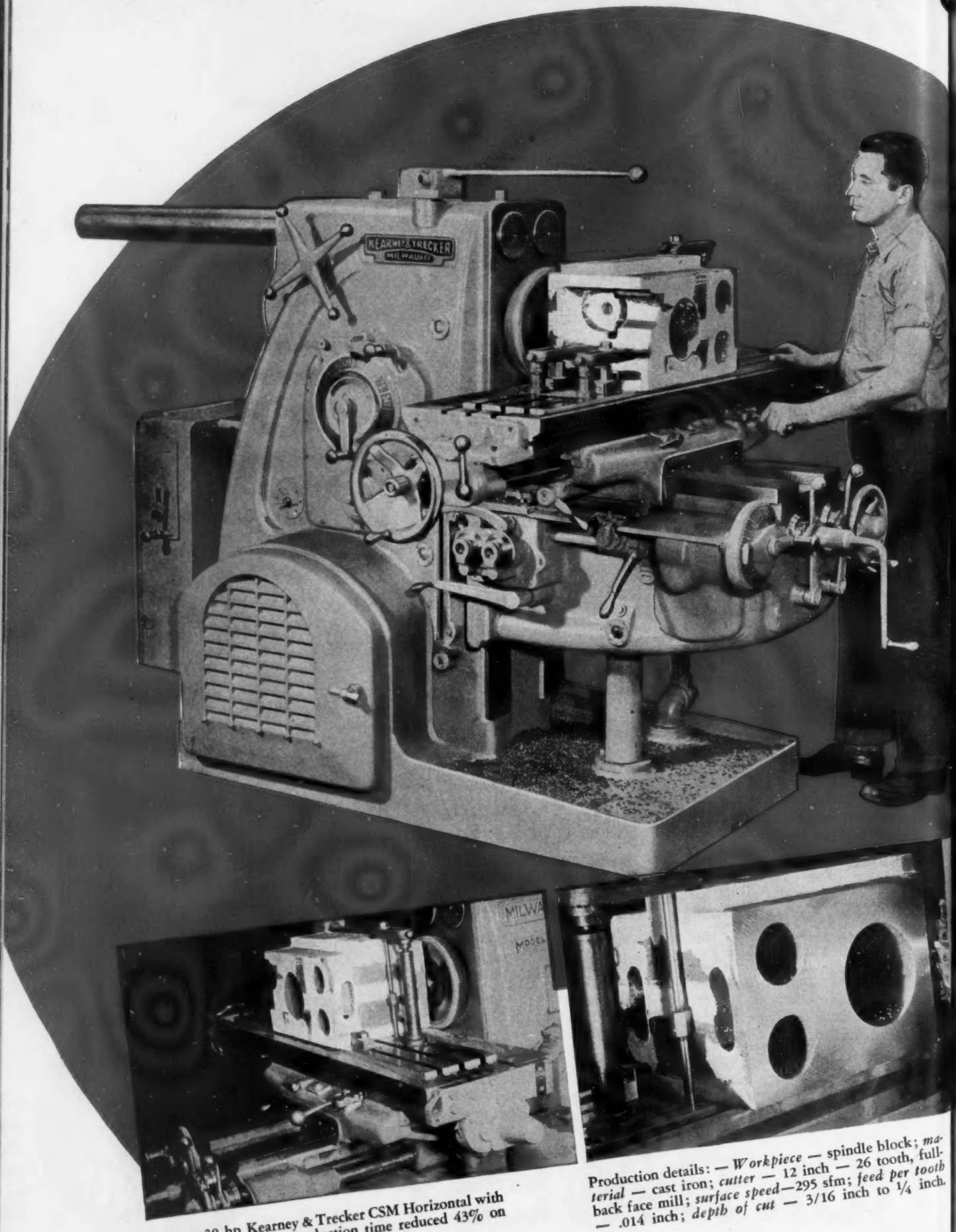
With a Northwest you can cut your heavy handling costs to a minimum without expensive overhead or tracks. Plan ahead now. Northwest brings you a combination of advantages found in no other crawler machine and there is a size for every job.

NORTHWEST ENGINEERING CO.
1805 Steger Bldg., 28 E. Jackson Blvd.
Chicago 4, Illinois

4 to 44 tons

NORTHWEST
The Crane that goes Anywhere!

The Most Powerful Milling



Using a 30 hp Kearney & Trecker CSM Horizontal with carbide cutters, total production time reduced 43% on this face milling operation.

Production details: — *Workpiece* — spindle block; *material* — cast iron; *cutter* — 12 inch — 26 tooth, full-back face mill; *surface speed*—295 sfm; *feed per tooth* — .014 inch; *depth of cut* — 3/16 inch to 1/4 inch.

Machines of Their Type!

20-30-50 hp

Kearney & Trecker CSM's

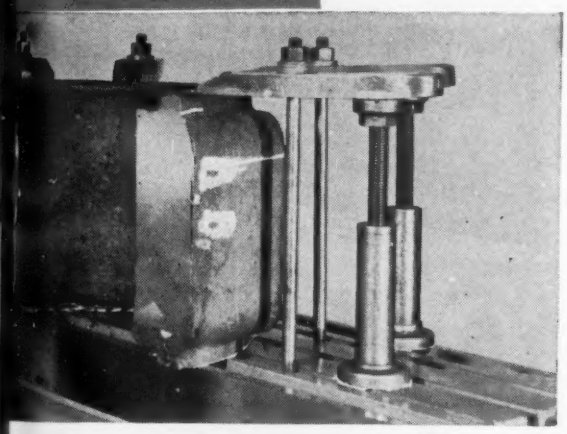
★ You get new high rates of metal removal—ferrous and non-ferrous — without sacrifice of precision.

★ —you get closer tolerances—finer finishes—precision performance — through smooth flow of power to the cutter.

★ —expressly designed for carbide milling of steel but adapted to all-purpose milling, as well.

★ —broad range of application — wide range of speeds and feeds.

★ —exceptional ease of operation — centralized conveniently located controls.



Machine Time Reduced 87%:—surface finishes improved when this operation was performed on a 20 hp CSM Horizontal using carbide milling cutters! *Workpiece* — bearing shell; *material* — cast steel; *cutter* — 10 inch, 12 tooth CSM face mill; *surface speed* — 460 sfm; *feed per tooth* — .010 inch; *depth of cut* — 3/16 inch to 1/4 inch.

Engineered—from the ground up—for every milling need of today and tomorrow — investigate Kearney & Trecker CSM's; write for Catalog No. CSM-20.

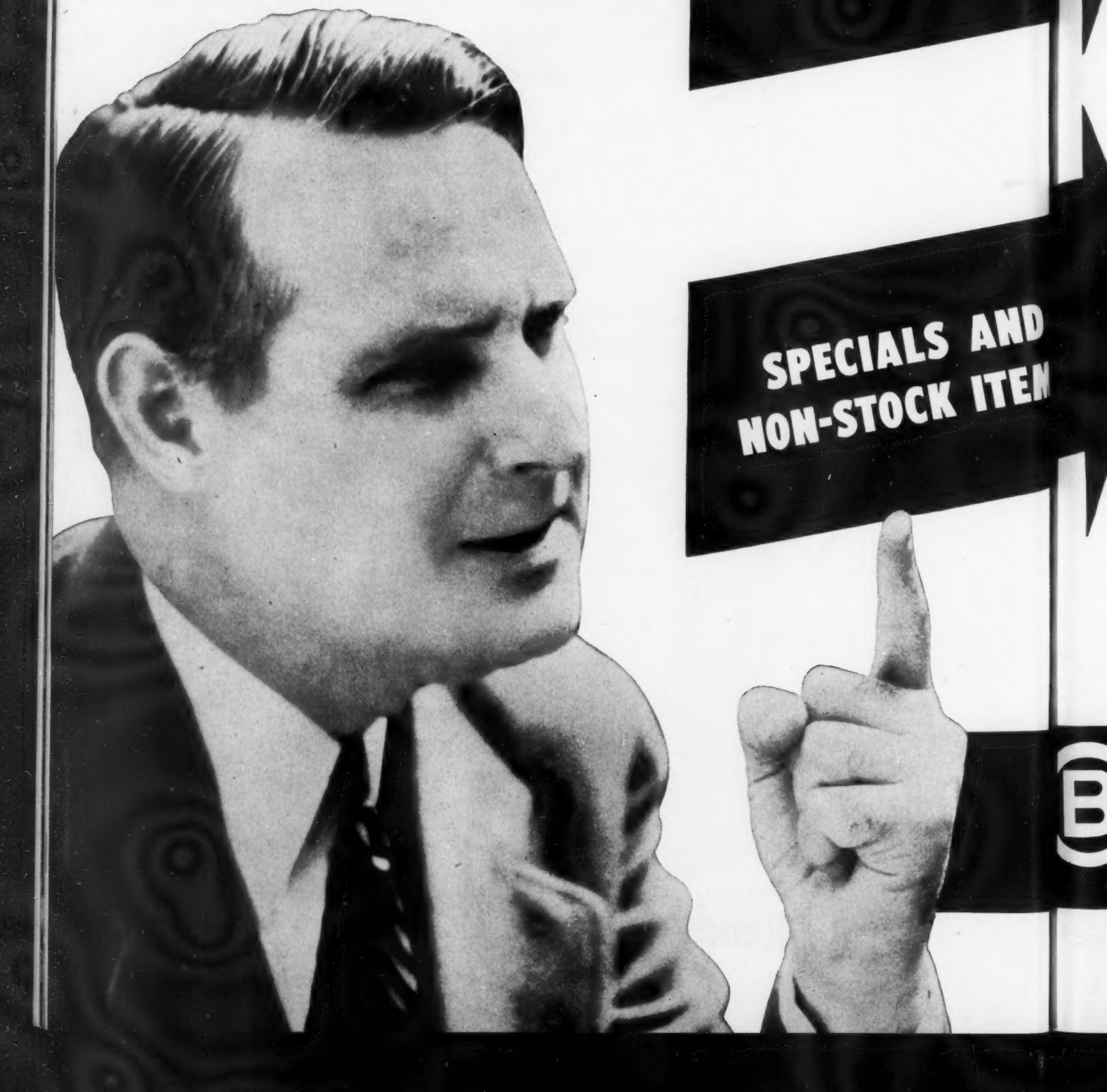
471

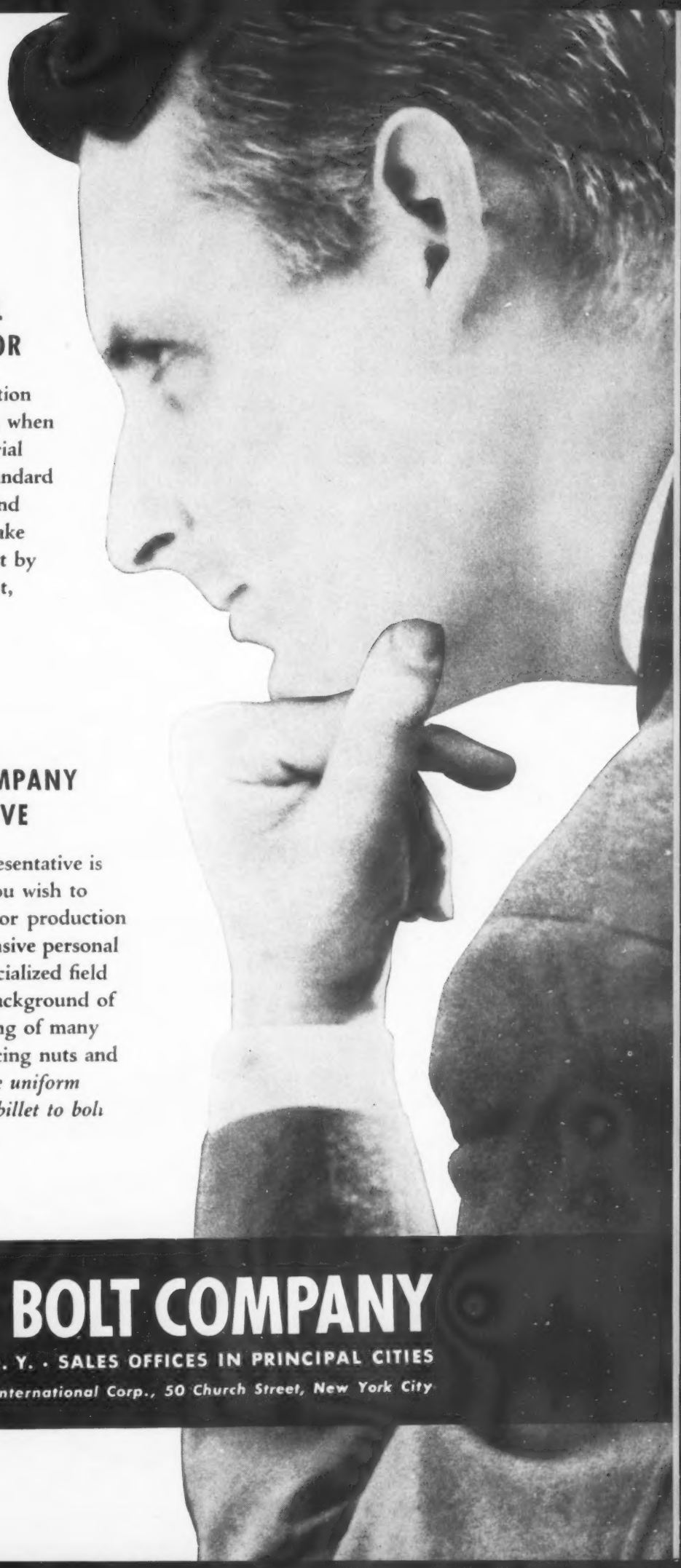
Kearney & Trecker
CORPORATION
MILWAUKEE 14, WISCONSIN

"Be Ready for Tomorrow—with CSM's!"

Here's the purchasing procedure we recommend for the efficient buying of

NUTS AND BOLTS...





YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

No one is in a better position to give you what you want, when you want it than your industrial supply distributor. For all standard "stocked" Circle Ⓑ nuts and bolts, call him in. You'll make your purchasing more efficient by benefiting from his prompt, intelligent service.

BUFFALO BOLT COMPANY REPRESENTATIVE

Your local Circle Ⓑ representative is the man to see whenever you wish to purchase specials, non-stock or production items. Remember his extensive personal experience in this highly specialized field is backed up by a rich background of manufacturing skill consisting of many years experience in producing nuts and bolts of all types *of which the uniform quality is controlled from billet to bolt in one single plant.*

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WHIRLEY GANTRIES

(USED)

There is no need for heavy industry to wait for this type crane. Whirley Portal Gantry Cranes, from 5 to 50 ton pick-up capacity, are available right now at less than one-half of today's prices.

These cranes have seen some use but are in excellent condition to give tough service for years to come. All were built by well known manufacturers with outstanding reputations in modern industry. The low sale price marks this equipment as the best dollar-value on the industrial market.

Act today! Write your nearest W.A.A. Regional Office for complete information and comparative costs.

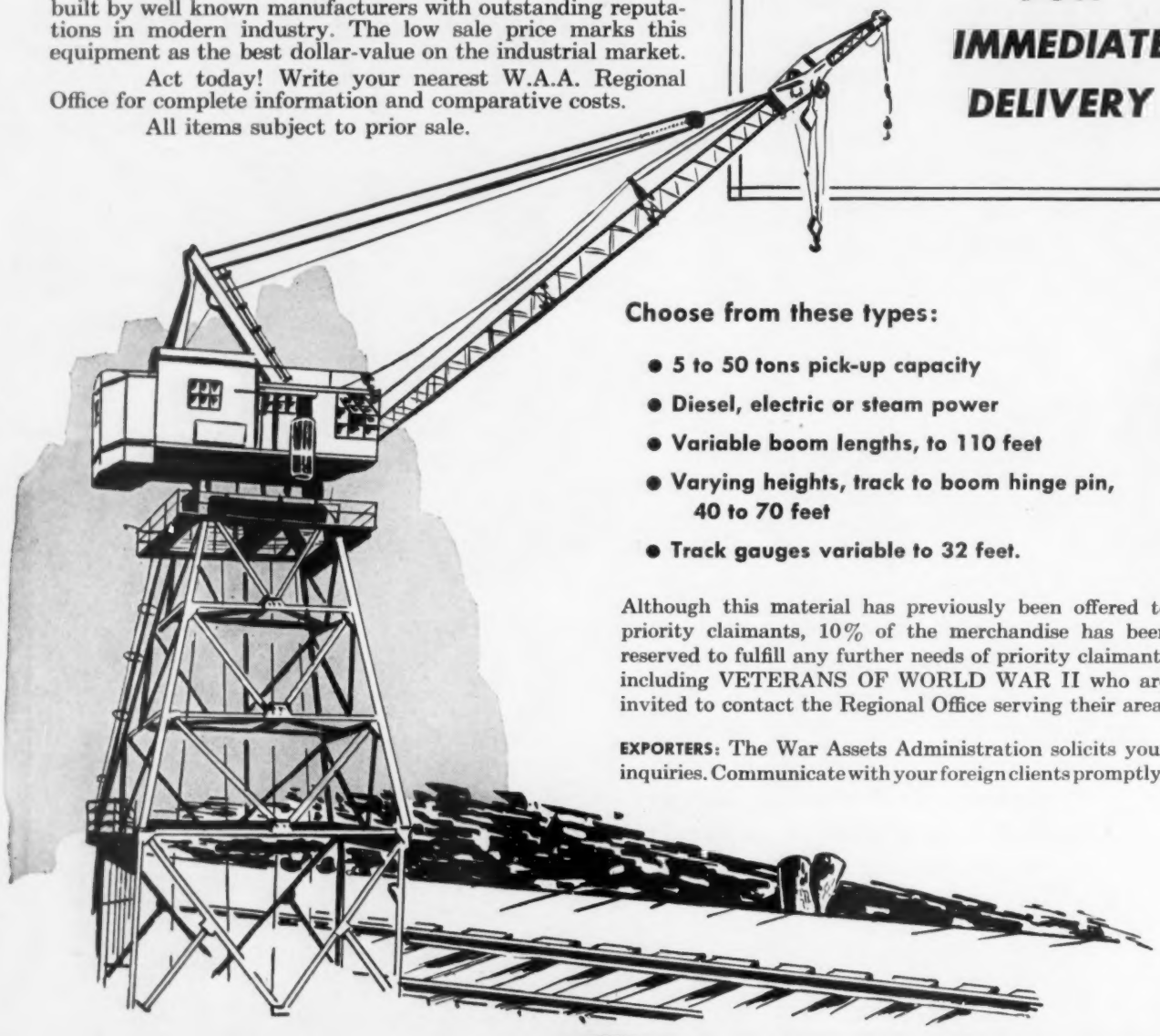
All items subject to prior sale.

$7,000

to

$24,000 F.O.B. LOCATION

FOR IMMEDIATE DELIVERY



Choose from these types:

- **5 to 50 tons pick-up capacity**
- **Diesel, electric or steam power**
- **Variable boom lengths, to 110 feet**
- **Varying heights, track to boom hinge pin, 40 to 70 feet**
- **Track gauges variable to 32 feet.**

Although this material has previously been offered to priority claimants, 10% of the merchandise has been reserved to fulfill any further needs of priority claimants including VETERANS OF WORLD WAR II who are invited to contact the Regional Office serving their area.

EXPORTERS: The War Assets Administration solicits your inquiries. Communicate with your foreign clients promptly.

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GOVERNMENT OWNED SURPLUS

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642-2

Are You Wrestling with Manufacturing Problems? You Can Get *More* Products per Ton—*Better* Products per Ton—with N-A-X HIGH-TENSILE Steel

Manufacturing experience proves it true: N-A-X HIGH-TENSILE steel enables the average user of hot- and cold-rolled sheets to increase production of units 33% *without* increasing steel consumption.

With this low-alloy, high-tensile steel, less metal is required for each unit. Sections are thinner, yet have *equal* strength and *greater* durability. This saving may well make it possible for you to produce four parts where you normally produce three.

N-A-X HIGH-TENSILE steel can be drawn and formed to intricate shapes. It has excellent weldability, high fatigue- and corrosion-resistance and great impact toughness. These superior qualities bring you not only a better product—but also important economies in handling, fabricating and finishing.

The full extent to which N-A-X HIGH-TENSILE can increase and improve your production depends, of course, on your own particular products and methods. Our metallurgists and engineers will be glad to help you investigate fully.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N-A-X
HIGH-TENSILE STEEL

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GREAT LAKES STEEL CORP.

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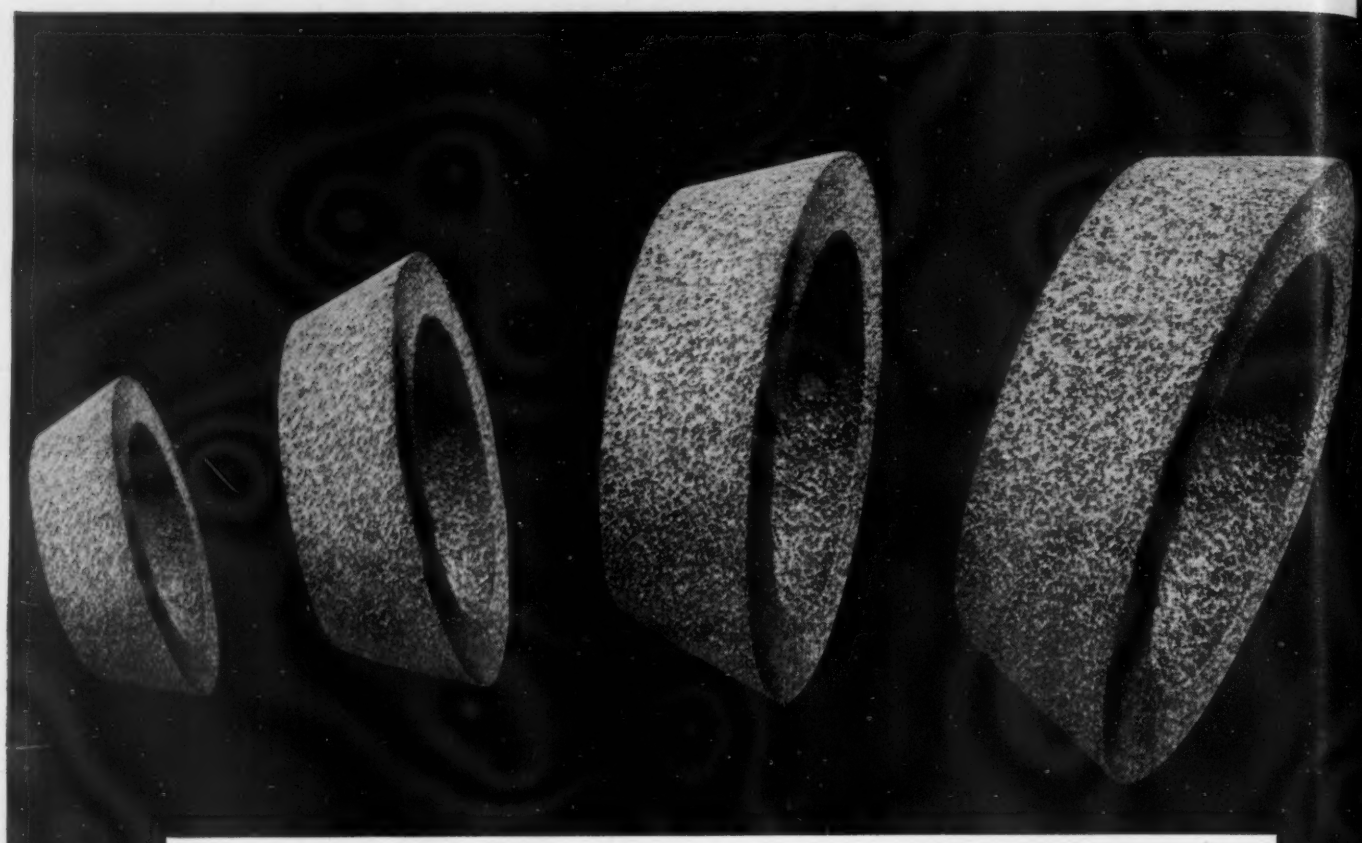


Would you say your grinding is perfect?

Unless a complete analysis of your grinding has been made... unless the correct wheels and machines are on your job . . . the best you can have is second best.

But you can have grinding second to none in production speed and low cost if you shift to Peninsular job-designed wheels.

For best results, call in Peninsular engineers. They study your machines, they study your grinding methods, they study the metals you grind. Their findings are used to develop grinding wheels and machines for maximum production speed.

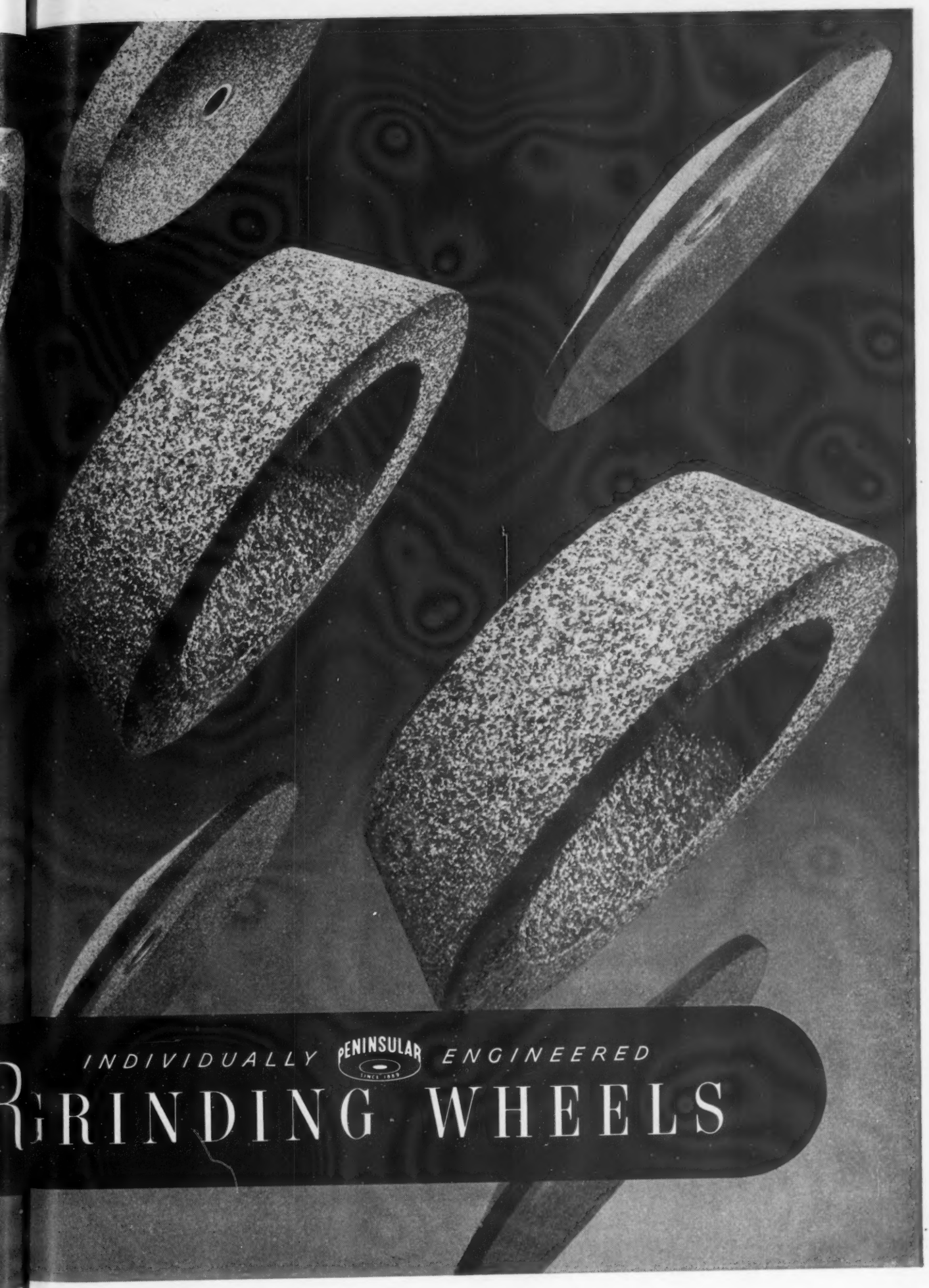
Peninsular can show you the way to reduced grinding costs that will be worth your while. *Every* Peninsular grinding wheel is specially made for its particular job.

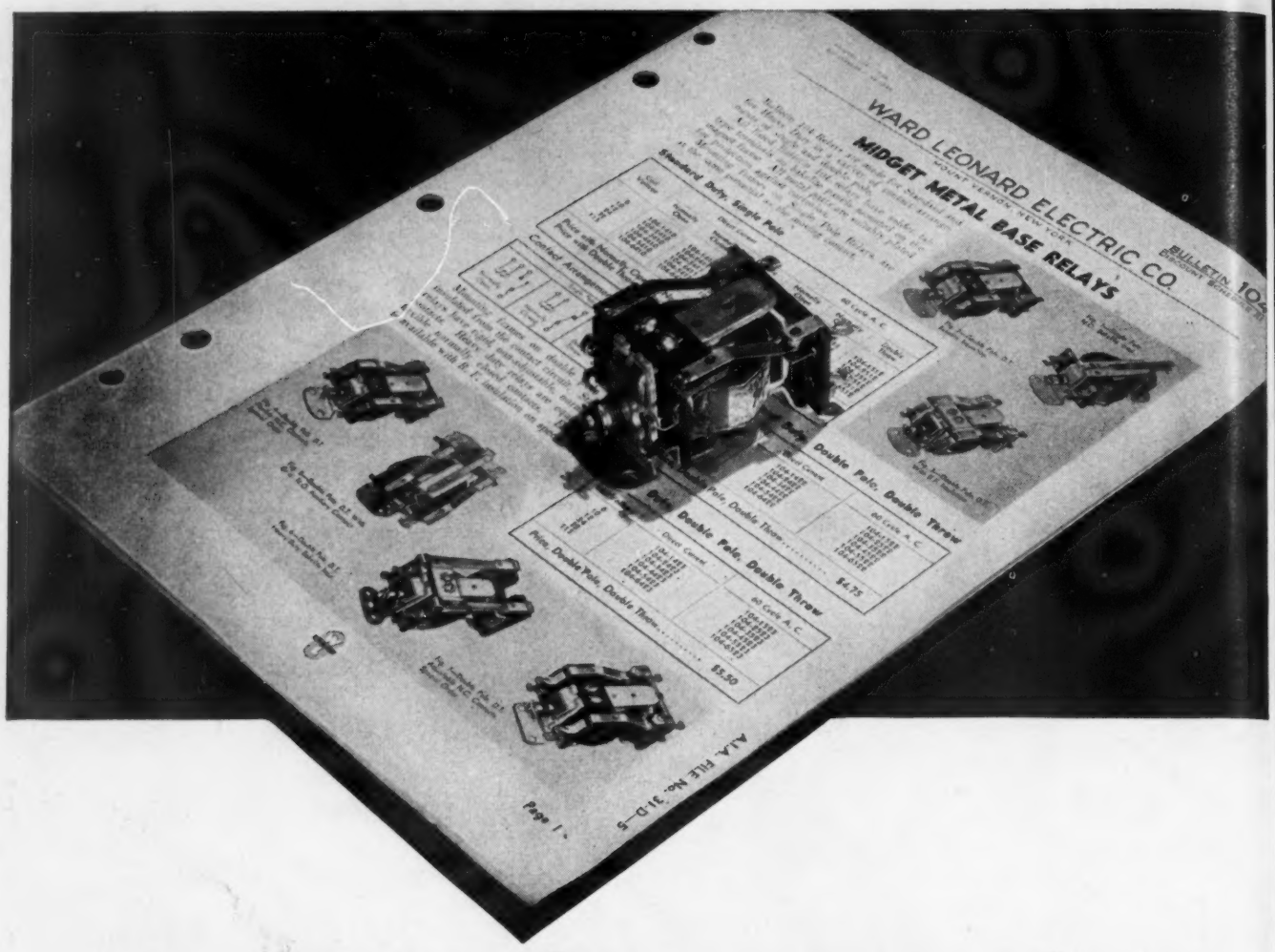
The Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit 7. *Sales Offices:* Chicago, Philadelphia, Boston, Buffalo, Cleveland, Newark, Pittsburgh, Houston, St. Louis, Cincinnati.

PENINSULAR

SINCE 1889

SPECIALISTS IN RESINOID BONDED WHEELS


INDIVIDUALLY PENINSULAR ENGINEERED
GRINDING WHEELS



you want to know more about BULLETIN 104 RELAYS

This group, Bulletin 104 Relays, includes standard and heavy-duty types, in a wide variety of contact arrangements, of single and double pole for front or rear mounting. They are positive in action, they are compact, they are sturdy. When designing any equipment that requires a relay function, see what Ward Leonard has to offer you. Ward Leonard Relays include types and sizes for every application. They all have crisp action, are dependable and durable yet consume but little current.

Bulletins are available describing Ward Leonard Relays, Resistors, Rheostats and Motor Controls. Send for the bulletins of interest to you.

WARD LEONARD

RELAYS • RESISTORS • RHEOSTATS

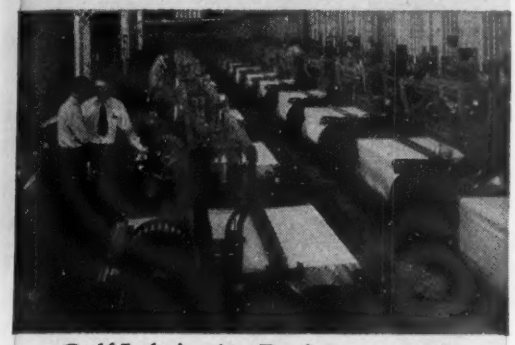
Electric control devices since 1892

WARD LEONARD ELECTRIC COMPANY

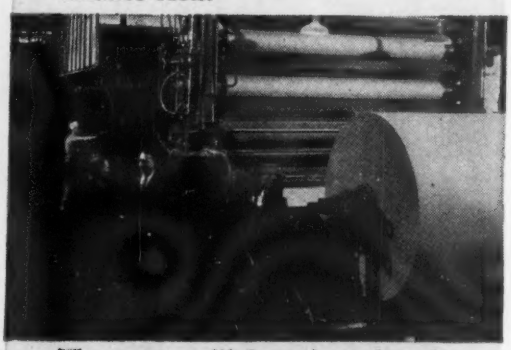
65 SOUTH STREET, MOUNT VERNON, N.Y. • OFFICES IN PRINCIPAL CITIES

Over 200 railroads in the United States use Gulf lubricants and fuels —and get the benefit of the co-operative service extended by Gulf's trained lubrication engineers.

The recommendations and practical suggestions of Gulf Lubrication Engineers are adopted by scores of leading power plants in 30 states from Maine to New Mexico.



Gulf Lubrication Engineers consult regularly with textile mill officials and operating men to help insure efficient production and low maintenance costs.



The paper mill Superintendent in the picture says, "We get greater tonnage and keep maintenance costs down by following Gulf Engineering recommendations."

Gulf Lubrication Engineers are welcome visitors in hundreds of coal mines as they make their periodic calls to insure efficient lubrication and lower operating costs.

Adopt

Gulf Periodic Consultation Service

to insure efficient lubrication the year-round, lower costs—

HERE are two easy steps you can take to help keep your plant up to maximum efficiency: Call in a Gulf Lubrication Engineer and let him work with your operating and maintenance men to install improved lubrication practice; then adopt Gulf Periodic Consultation Service to insure efficient lubrication the year round.

After you adopt this practical, money-saving plan, a trained Gulf Lubrication Engineer will make periodic service calls at your plant. He will make additional recommendations to meet changed conditions and keep your plant men informed on latest developments in lubricants and application methods. At all times he will seek to further improve your lubrication practice, increase production, and reduce costs.

Act now to get the many benefits that can be obtained through Gulf Periodic Consultation Service. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
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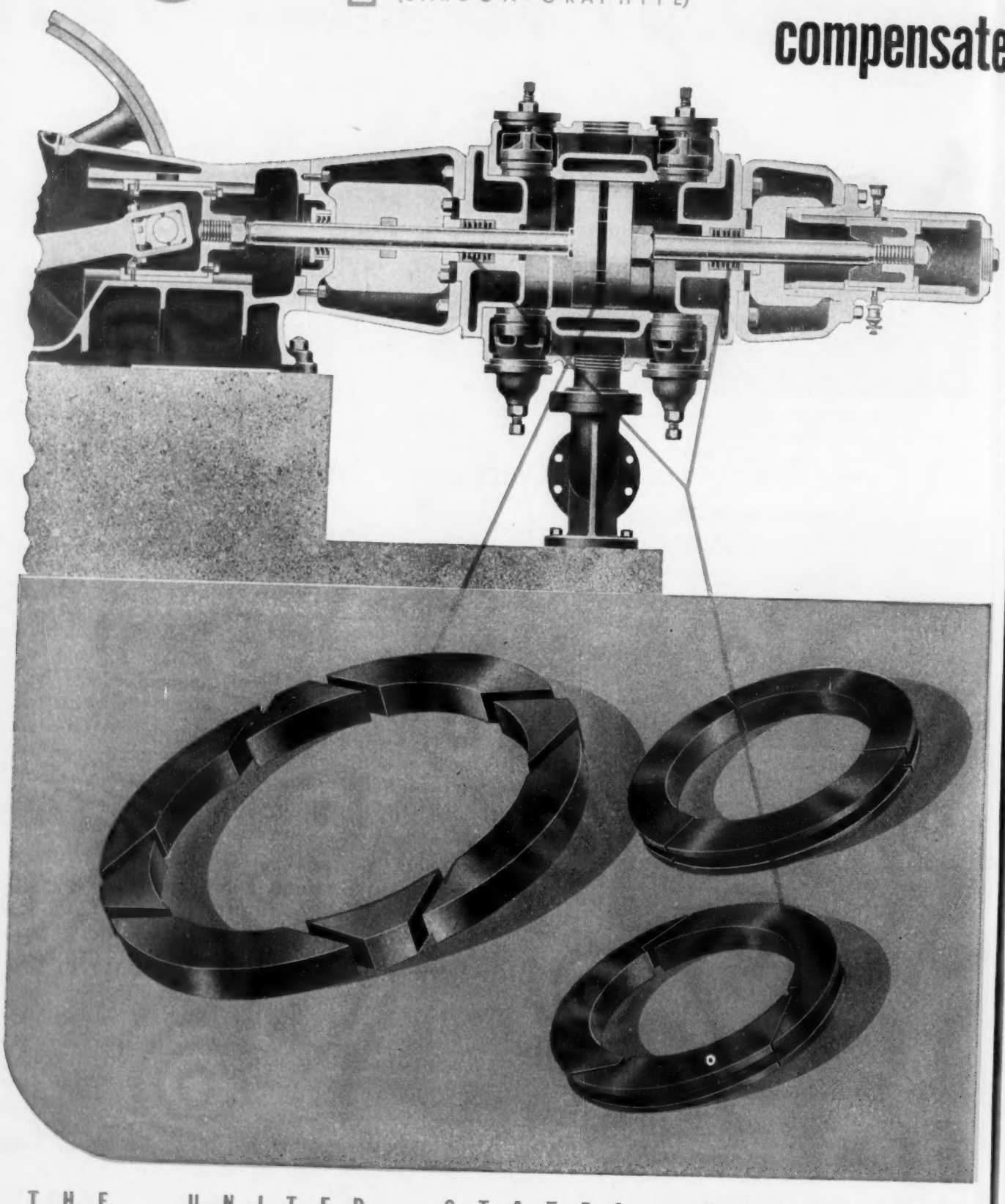
GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost

graphitar

(CARBON-GRAPHITE)

piston and compensate

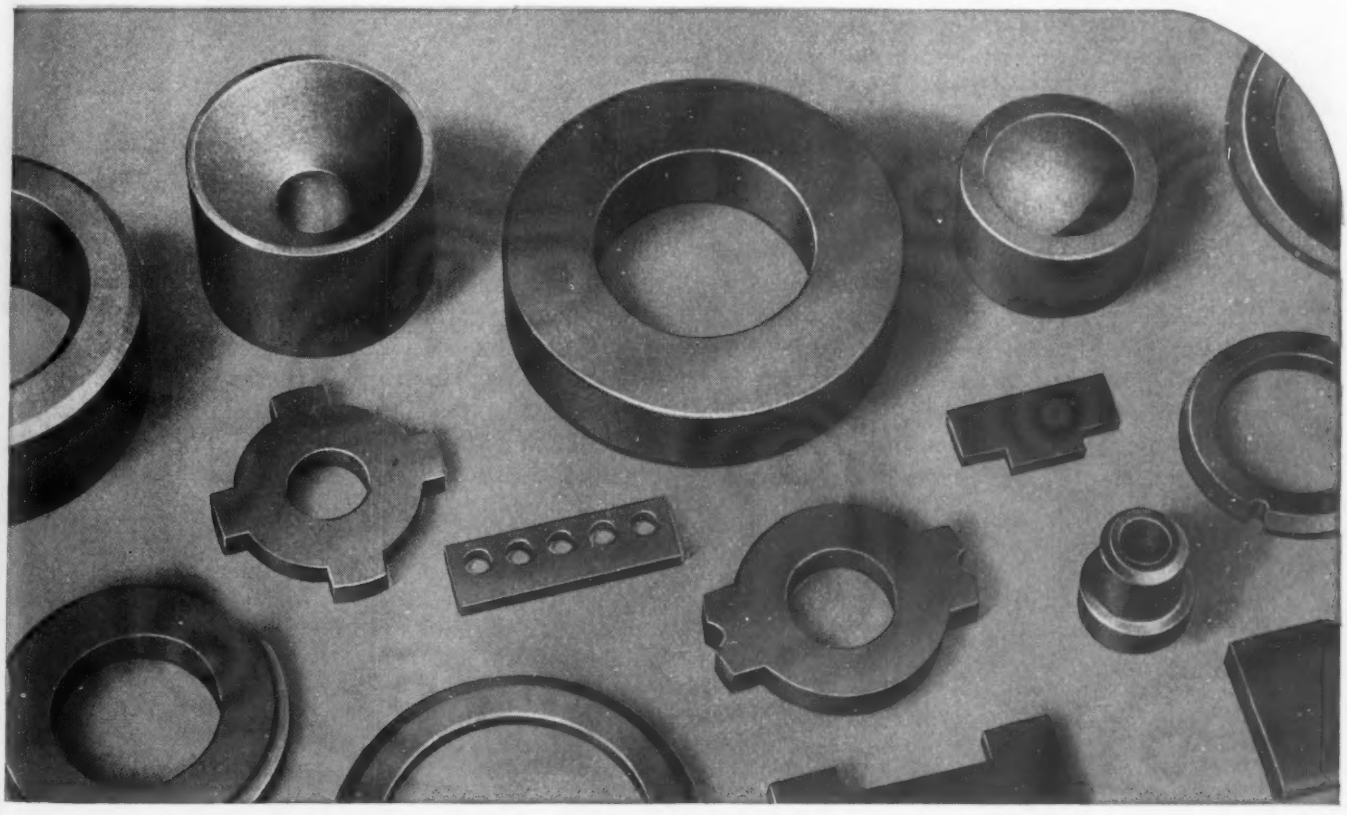


THE UNITED STATES GRAPHITE

acking rings in PENNSYLVANIA compressors
themselves for wear

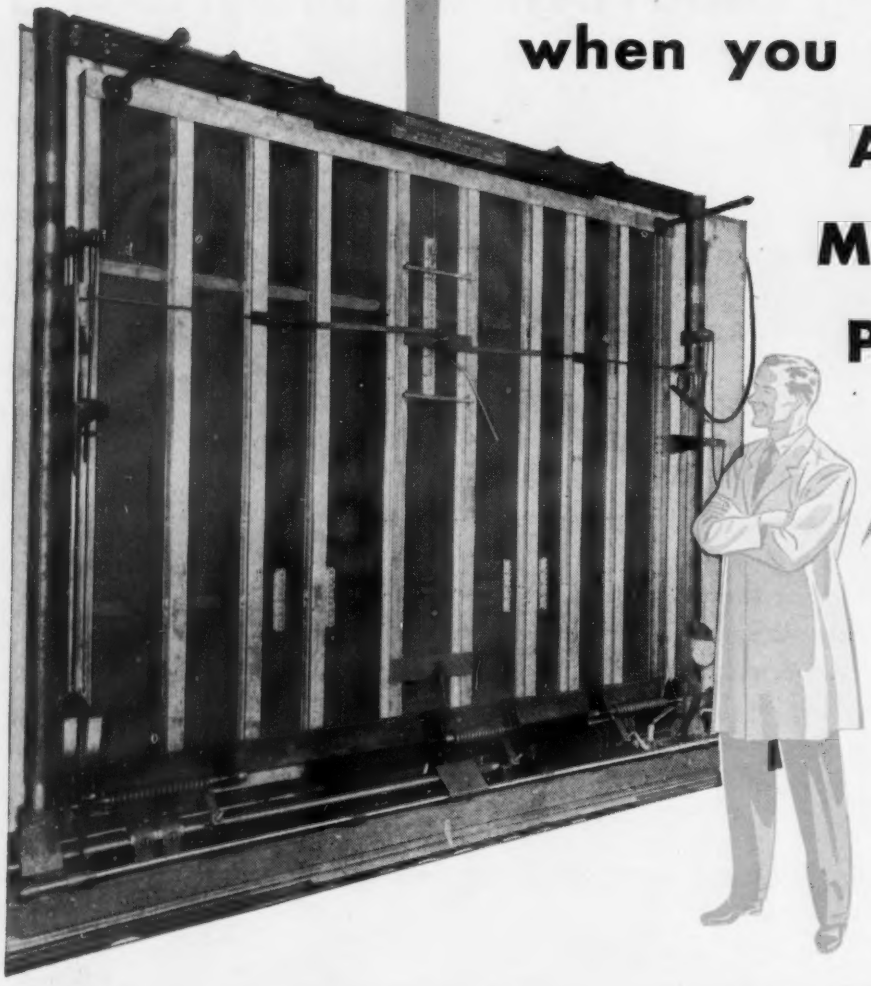
One of the great advantages of the Pennsylvania compressor is the fact that it operates perfectly without lubrication, assuring compressed air or gas that is absolutely free of oil, because the piston rings and packing rings are made of Graphitar. Self-lubricating, unaffected by extreme temperature, highly resistant to friction, segmental Graphitar piston rings seal effectively and, under pressure of springs seated in the piston groove, automatically expand to compensate for slight wear Graphitar packing rings in both inboard and outboard cylinder stuffing boxes are also made in segments which contract under spring pressure, providing longer-lasting, more efficient sealing. The unfailing performance of Graphitar parts in Pennsylvania compressors is being duplicated in scores of other type mechanisms. Graphitar is chemically inert, mechanically strong, and yet exceptionally lightweight. It can be molded to a wide variety of shapes and sizes, and in small sizes can be ground to tolerances as close as .0005" Our engineers will be glad to study sketches of your products and determine whether Graphitar will improve mechanical performance at reduced cost. Write for 44-page catalog and see listing in Sweet's Product Designer's File.

graphitar
(CARBON-GRAPHITE)



COMPANY • SAGINAW, MICHIGAN

You can think BIG when you work with AMERICAN MAGNESIUM PRODUCTS



Backboard of a Rutherford Photocomposing Machine using American Magnesium extrusions to save weight. The board is rigid; no warping to cause distortion.

Has BIGness been a stumbling block because it involves excessive weight and unwieldiness? You can make an about-face in your thinking, if you start with featherweight American Magnesium products. Look at this equipment, for example—

It's eight feet high. Yet work goes fast, movements are precise, and one man handles it easily, thanks to the smart design and wide use of weight-saving Mazlo Magnesium.

American Magnesium Corporation makes a complete line of products to help you cut excess weight. Sand castings, permanent mold and die castings, shapes, sheet, and plate; all are available to the manufacturer whose development work has been stymied by the idea that size means overweight and too much bulk.

For help in designing magnesium into your products, call the nearby Alcoa office. Or write Aluminum Company of America, Sales Agent for American Magnesium products, 1721 Gulf Building, Pittsburgh 19, Pennsylvania.

MAGNESIUM MAZLO PRODUCTS

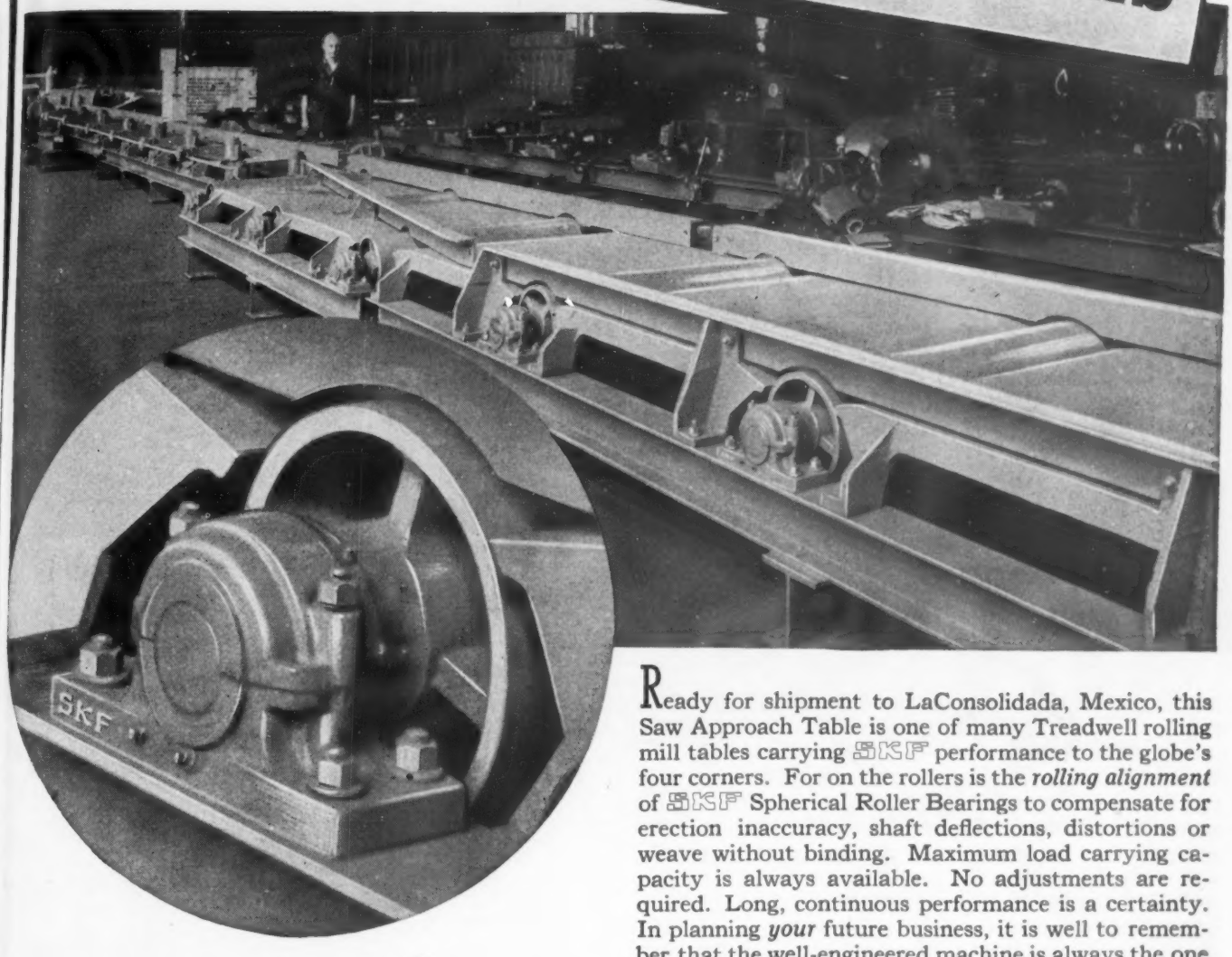
REG. U.S. PAT. OFF.

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF

ALUMINUM COMPANY OF AMERICA

FOR GOOD NEIGHBORS

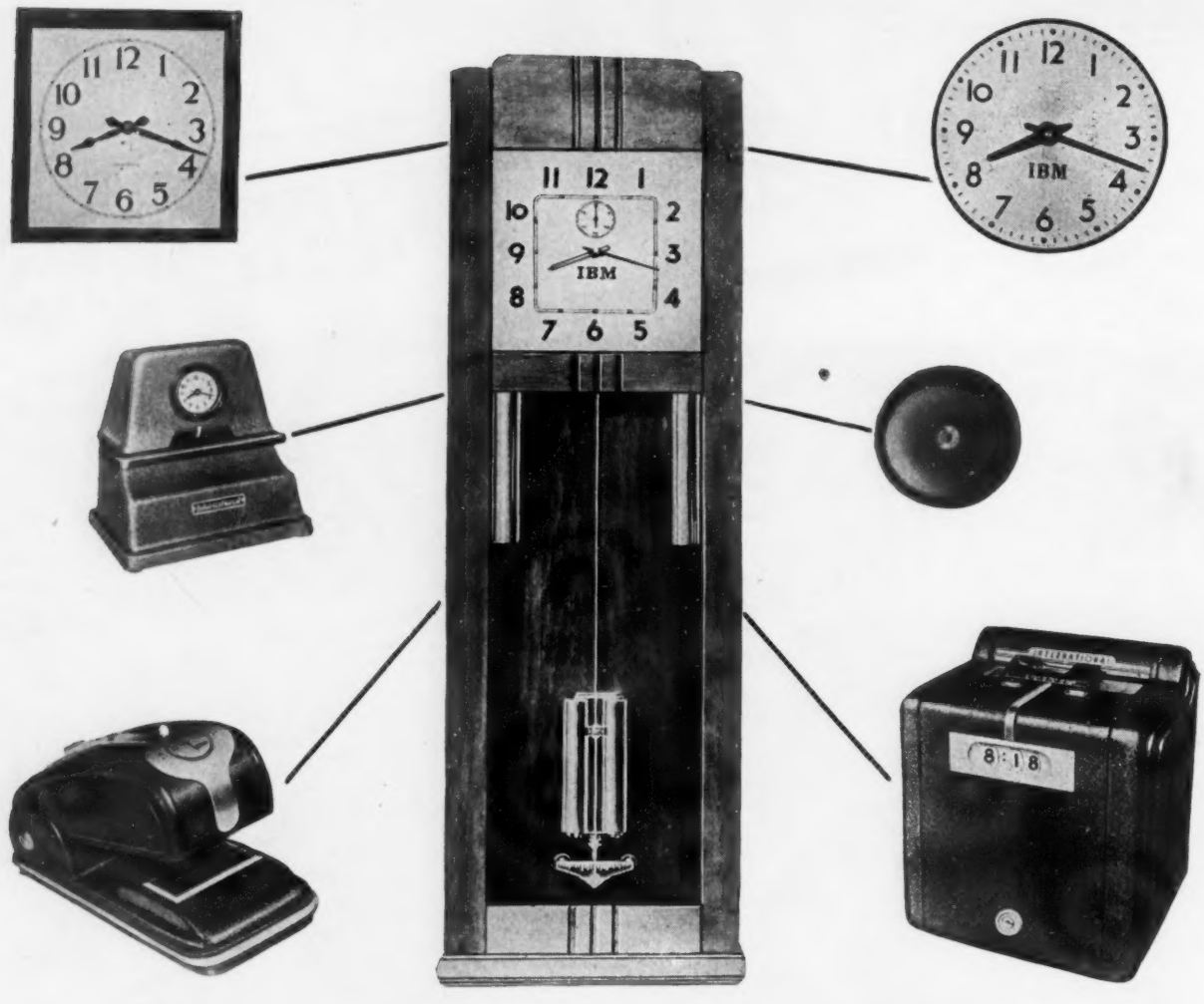


● Built by Treadwell Eng'g Co., Easton, Pa., this Saw Approach Table depends upon compact, rugged, two-piece SKF Pillow Blocks to protect SKF Bearings from lubricant leakage, dirt and liquids.

Ready for shipment to LaConsolidada, Mexico, this Saw Approach Table is one of many Treadwell rolling mill tables carrying SKF performance to the globe's four corners. For on the rollers is the *rolling alignment* of SKF Spherical Roller Bearings to compensate for erection inaccuracy, shaft deflections, distortions or weave without binding. Maximum load carrying capacity is always available. No adjustments are required. Long, continuous performance is a certainty. In planning *your* future business, it is well to remember that the well-engineered machine is always the one that's SKF-equipped. 6123

SKF INDUSTRIES, INC., PHILA. 34, PA.

SKF
BALL AND ROLLER
BEARINGS



One Accurate Time

throughout your entire plant

Every department, every office, every building operates on the same accurate time when it is equipped with the IBM Self-Regulating Electric Time Indicating System.

An IBM Master Time Control "manages" your entire timing operation with split-second accuracy, checks each secondary clock once each hour and coordinates it with the Master.

Shifts come and go, their movement based on identical time. Each employee knows at a glance when to expect the change-shift signal. Uncertainties and confusion caused by time inaccuracies are eliminated.

The Master Control coordinates time records, too, through its "management" of IBM Time Recording devices. Of many types, these include Attendance Time Recorders, Door Recorders, Job Time Recorders. IBM Systems also provide for coordinating signaling devices employing bells, buzzers, gongs, horns or sirens.

IBM's complete and fully responsible advisory service is yours without obligation.

IBM

TIME RECORDERS AND ELECTRIC TIME SYSTEMS

Electric Punched Card Accounting Machines—Electric Typewriters

International Business Machines Corporation, World Headquarters Building, 590 Madison Avenue, New York 22, N. Y.

THE NEW ORDER IN LOCOMOTIVES

A new series of steam locomotives is being constructed in which the usual order is being reversed —the coal tender coming first—then the driver's cab—the boiler—and finally the water supply. This design gives the engineer better protection and visibility. Continually we are finding ways to do things better—getting away from the conventional. This is particularly true in the field of metals, where the light alloys—aluminum and magnesium—not only are replacing heavier metals, but are being used in substitution for other types of materials to give better service. If your product uses—or could use—aluminum or magnesium to decrease its weight, with no loss of strength—or to increase its eye and sales appeal—Bohn engineers would like to discuss the problem with you.

BOHN ALUMINUM AND BRASS CORPORATION—GENERAL OFFICES—LAFAYETTE BUILDING—DETROIT 26, MICH.

Designers and Fabricators—**ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS**

Try the New FLEXARC SW-2 ELECTRODE

(A KING-SIZE SW)

on the House!

It's the "operator's own electrode"—the new Flexarc SW-2—developed by Westinghouse in diameters from $\frac{3}{16}$" to $\frac{5}{16}$" because of the widespread demand for the smaller diameter SW electrodes.

This new cost-cutting electrode gives extra footage of weld because of its flat fillet contours. The SW-2 has smooth uniform metal transfer with full side wall wash up. It gives equally good results—with a-c or d-c in all positions—on wrought iron, low or medium carbon steel, low-alloy, high strength steel, copper bearing steel and on low and medium carbon cast steel.

Both operators and supervisors are invited to check these facts on their own production—using the free samples which will be sent on request.

J-21368

GET FREE SAMPLES OF SW-2 ELECTRODES

Try these new electrodes on your own jobs. They're unexcelled for—

All-position welding—single or multiple-pass fillets and butts, with a-c or d-c—

Flat contours without undercut, yield more weld footage per pound of electrode—

Self-freeing slag characteristics—cuts cleaning time with a resultant saving—

Easy manipulation and striking characteristics in open or close welding spaces—makes the operator's job easier—

Excellent root penetration with unusually good x-ray welds.

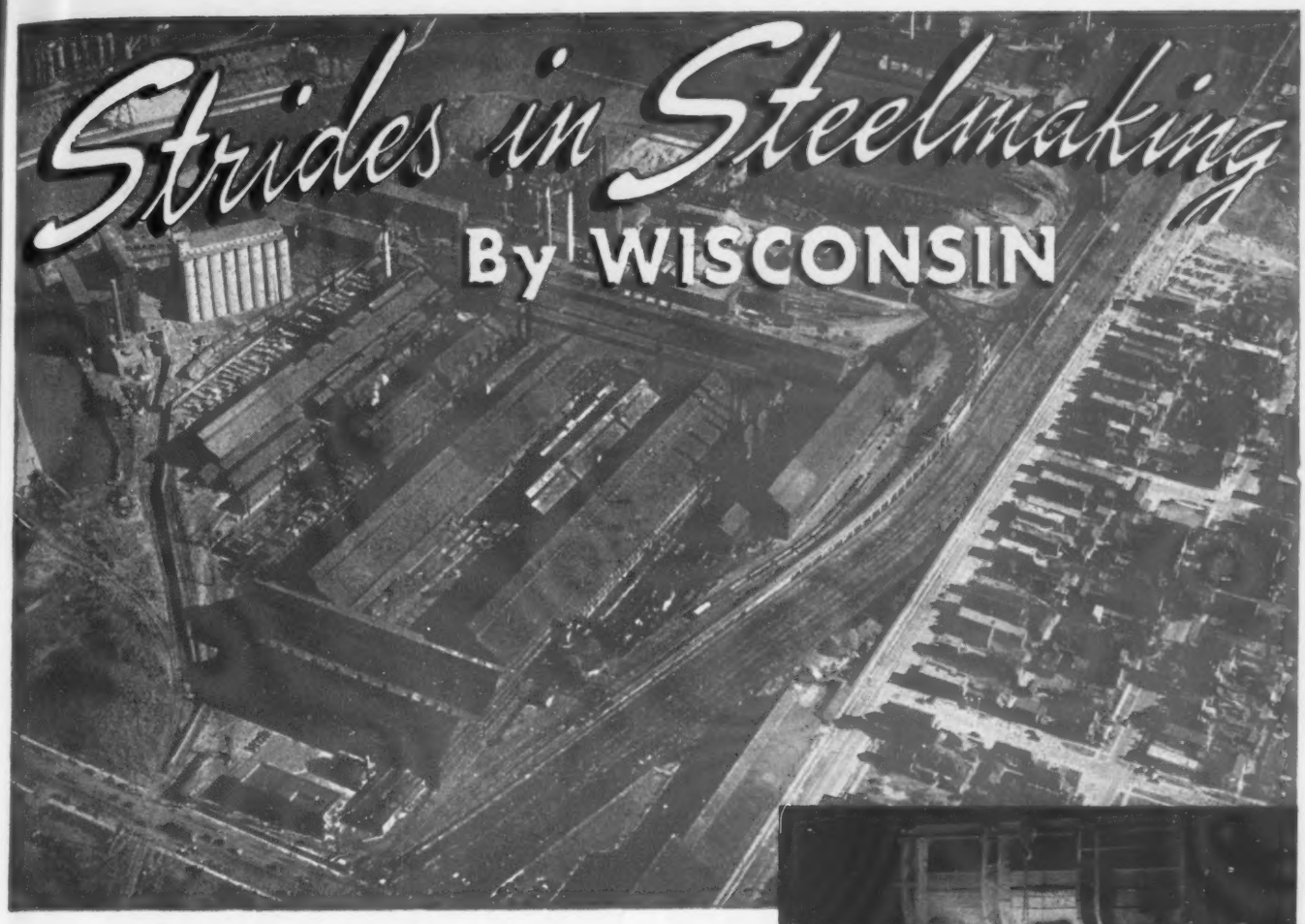
Write for your *Free Samples* specifying diameter used . . . on your company letterhead . . . to Westinghouse Electric Corporation, P. O. Box 868-A, Pittsburgh 30, Pa.

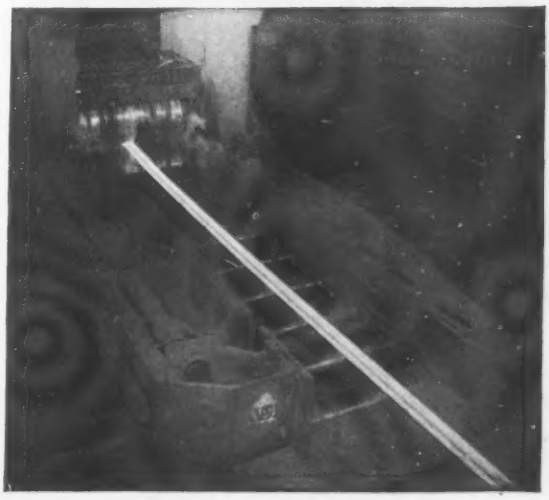
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

FLEXARC ELECTRODES

Send for this new booklet. Gives complete details of SW-2 performance, time and cost reduction. Ask for B-3710.





• Two great strides in steelmaking are *Sulfite-Treated Steel,* the more machinable steel, and *"H" Steels,* alloy steels of guaranteed hardenability.

Sulfite-Treated Steel, originated and developed by Wisconsin metallurgists, has proven itself to be far more machinable than ordinary steel even after being hardened by heat-treatment. Yet its physical properties are entirely satisfactory. In every application where machinability counts, increased production and lowered costs have been the result.

"H" Steels are alloy steels produced to your "product prescription." This means that "H" Steels have a much narrower hardenability band *guaranteed.* Wisconsin has been a leader in the development of these steels and at present is the largest producer of "H" Alloy Steels.

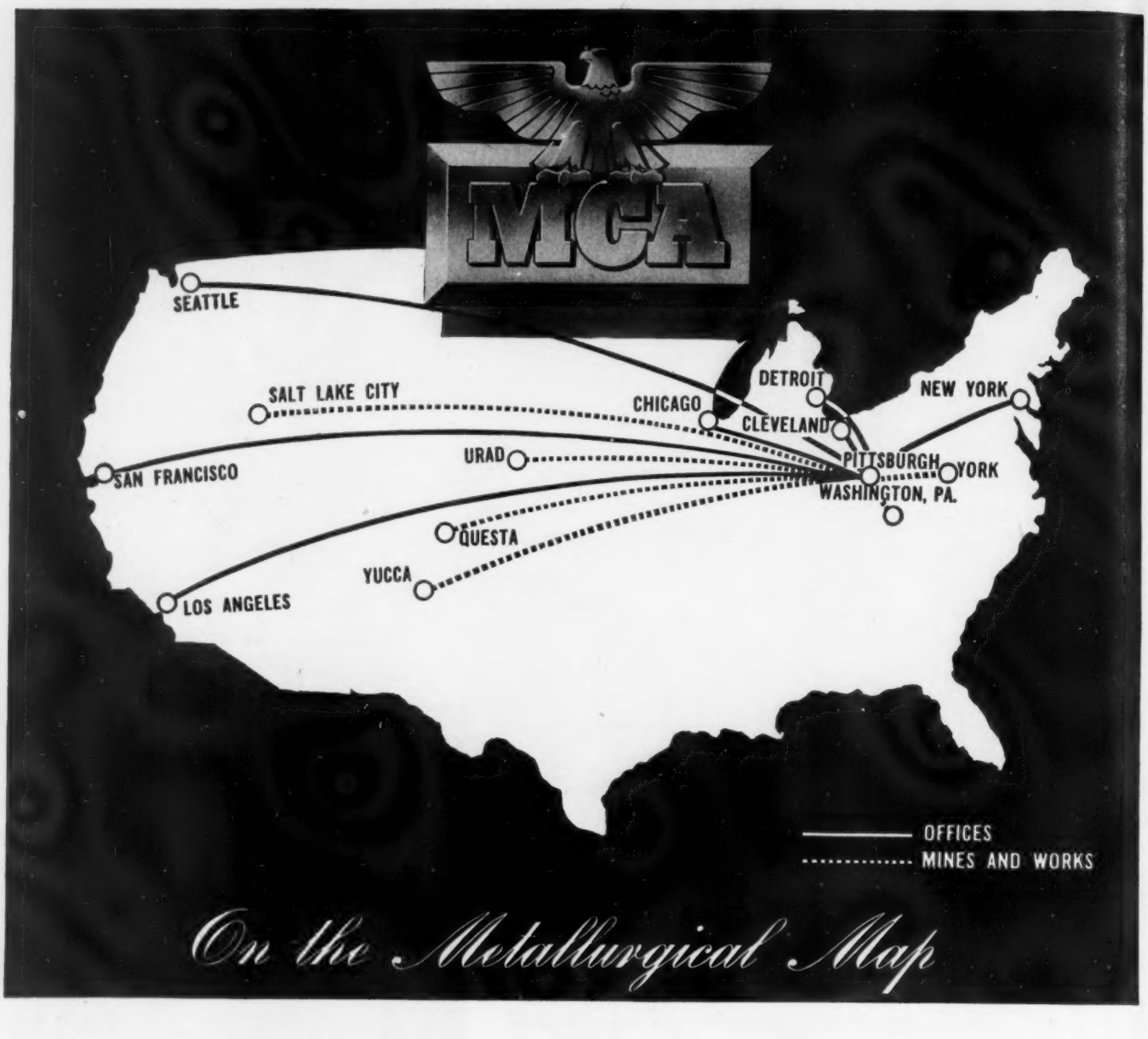
Wisconsin's completely integrated operations from ore and coal mines to the finished steel, staffed by top-flight steelmakers, are your assurance of excellence in alloy and special steels. Our sales and metallurgical staffs are at your service.

WISCONSIN STEEL COMPANY
(Affiliate of International Harvester Company)
180 North Michigan Avenue Chicago 1, Illinois

WISCONSIN STEEL OPERATIONS

IRON ORE MINES COAL MINES OPEN HEARTH FURNACES
HEAT-TREATING, COLD FINISHING AND ANNEALING FACILITIES
ROLLING MILLS ORE FREIGHTERS BLAST FURNACES

WISCONSIN STEEL



MCA HAS A LONG REACH

The extraction, reduction, and refining of Molybdenum and Tungsten have been the principal business of the Molybdenum Corporation of America for thirty years. More recently, MCA has become a supplier also of other alloying materials.

Mining and ore reducing operations on its own extensive properties represent by no means all of the Corporation's output. It has become a processor and distributing agency for other widely known concerns, handling metallurgical materials from remote sources in both hemispheres.

MCA competence includes, and MCA interests embrace, much more than can be described in one advertisement. The organization and facilities of the Corporation make it possible to meet special requirements. Correspondence is invited.

MASTER CRAFT ALLOYS

AMERICAN Production, American Distribution, American Control, Completely Integrated.

Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco, Seattle.

Sales Representatives: Edgar L. Fink, Detroit; Bromley-Donaldson Co., Los Angeles, San Francisco, Seattle.

Subsidiaries: Cleveland-Tungsten, Inc., Cleveland, O.; General Tungsten Manufacturing Co., Inc., Union City, N.J.

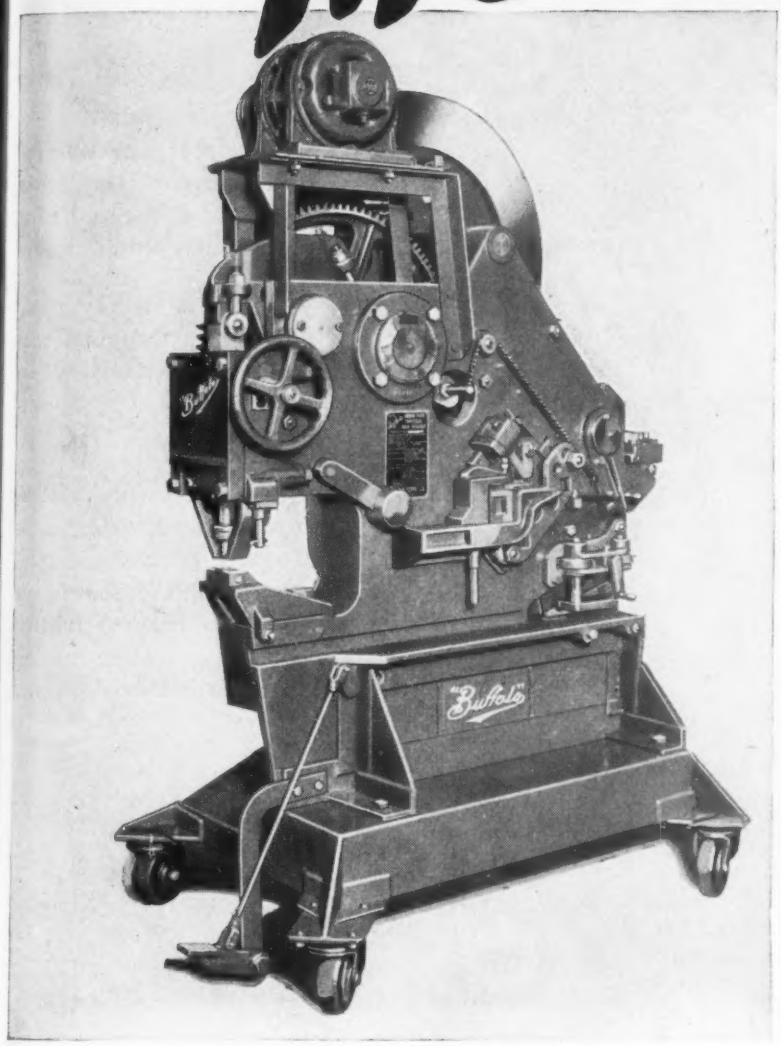
Works: Washington, Pa.; York, Pa.

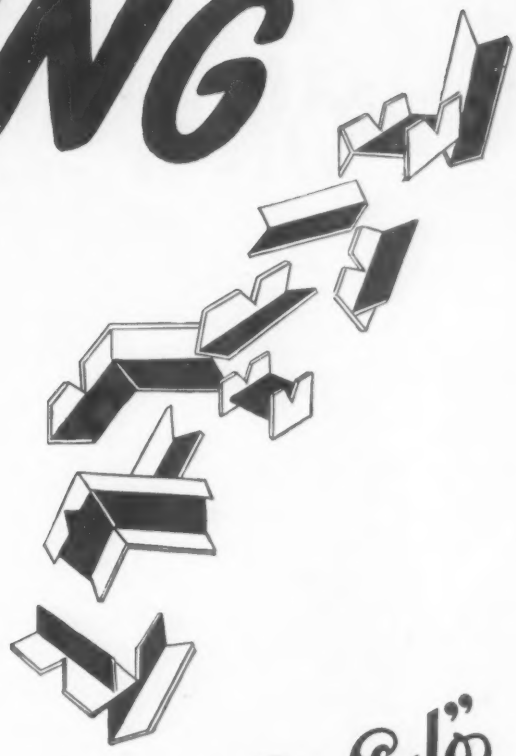
Mines: Questa, New Mexico; Yucca, Ariz.; Urad, Colorado.

MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

Keep Production MOVING





Let "Buffalo"

UNIVERSAL IRON WORKERS

Cut Your Costs

Yes, you can put *real speed* into those countless maintenance jobs involving *cutting, notching, shearing, punching* and *coping* steel angles, channels, beams, tees and other shapes. "Buffalo" Universal Iron Workers are capable of handling several such operations *at once* and *on one machine* . . . helping to keep your production costs down even during these times of mounting labor costs.

"Buffalo" Universal Iron Workers have punch capacities up to 1¾ x 1½" and shear up to 1½" plates. Thousands of them are keeping maintenance, production and repair fabrication *moving* in steel mills, railway shops and other heavy industries.

Complete details on these time and labor savers are yours on request. Simply write:

BUFFALO FORGE COMPANY
158 Mortimer Street **Buffalo, N. Y.**
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" UNIVERSAL IRON WORKER

then he said to himself:

"OK spelled backward is KO"

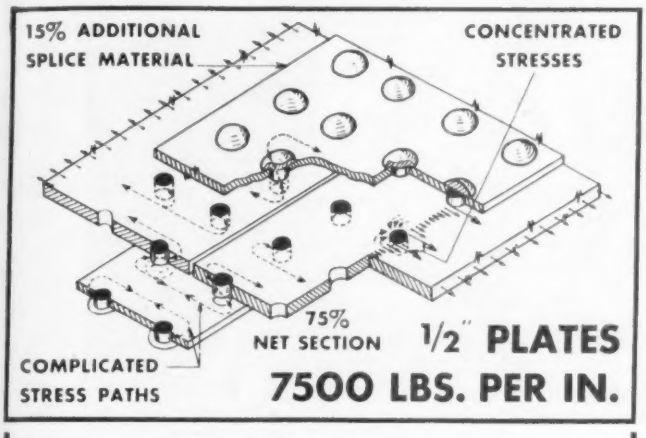
THE hero of Yugoslav resistance, the late Draja Mihailovich, at the end of a three-day questioning, finally said:

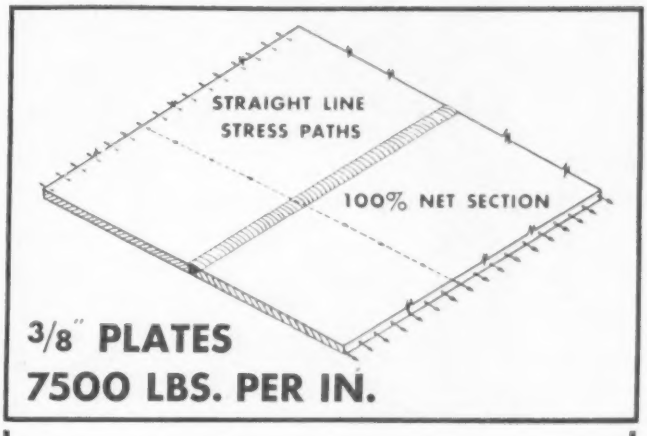
> "I wish you wouldn't torture me with rhetoric. When I am too tired, I say yes."

Far too many people are prone to dismiss a moot subject with a tired "Yes" . . . meaning they haven't the energy to explore for *facts* on which to base a gainful YES or NO . . . when it is so simple to do it this way . . .

Apply Draja's reasoning **to the choice between two methods of joining metal members . . . plates for example:**

Which would you *OK*?





THE RIVETED JOINT

Develops 7500 lbs./in.

Requires ½ inch plates

Requires 15% additional splice weight

Requires accurate detailing of 4 plates

Requires accurate punching of 4 plates

Requires 2 to 4 men to buck up and rivet

THE WELDED JOINT

Develops 7500 lbs./in.

Requires ⅜ inch plates

Requires no additional splice weight

Requires no detailing

Requires no plate preparation

Requires 1 man to arc weld

The Lincoln Engineer nearby will gladly help you explore further facts on the two methods as applied to your specific problems.

Machine Design Studies free to engineers and designers.

THE LINCOLN ELECTRIC COMPANY • DEPT. 28 • CLEVELAND 1, OHIO

America's greatest natural **recourse**

ARC WELDING

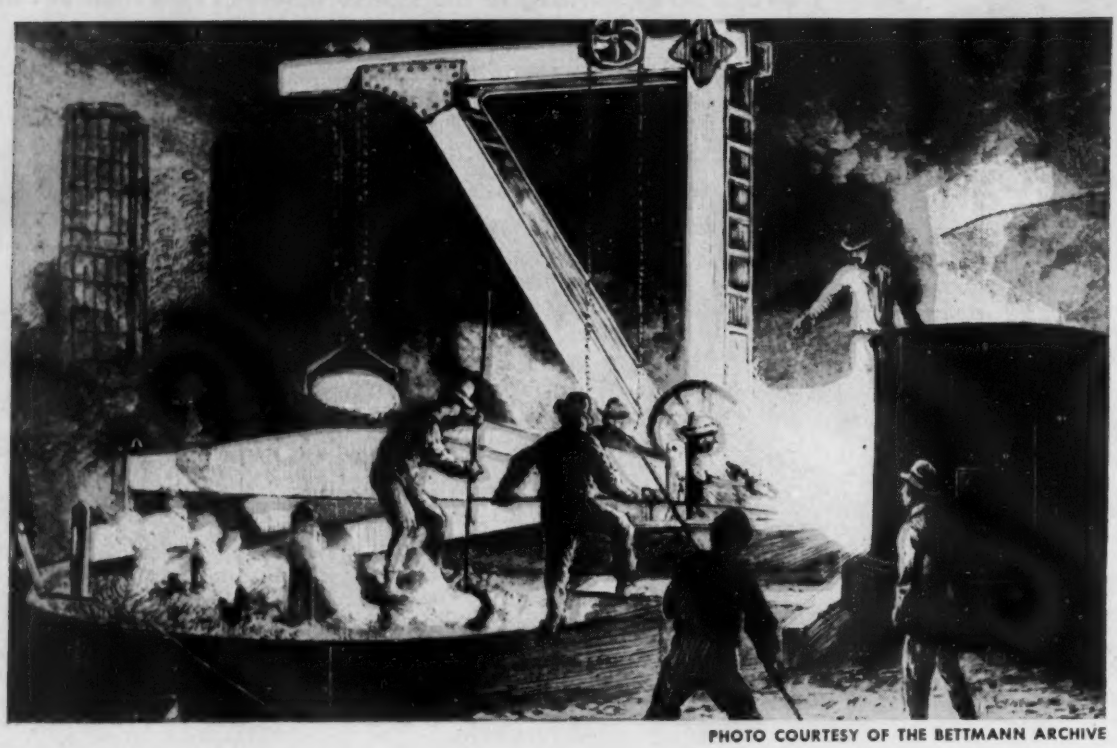


PHOTO COURTESY OF THE BETTMANN ARCHIVE

FROM A METAL-MASTER'S "FAMILY ALBUM"

When Foundries looked like this...

"STANDARD" was a veteran Metal Producer

These foundrymen of 1875 are turning out parts for a new iron bridge. The equipment seems quaint and old-fashioned, and the methods primitive, in the light of today . . . yet even at that time Standard Steel had been a metal producer for 80 years, and for a number of these years had been a leading manufacturer of locomotive tires.

In response to a growing demand for steel castings in locomotive design, Standard began production of steel castings almost half a century ago. Present capacity is 20,000 tons per year, with a large percentage of the output in driving wheel centers and miscellaneous castings for locomotives. Castings for all classes of service are produced, ranging in weight from 5 to 130,000 pounds. Steady improvements in quality have been made, resulting in large increases in desirable physical properties.

To simplify your purchasing, just "Standardize on Standard" for your forgings and castings. The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Penna., U.S.A. Offices: Philadelphia, New York, Chicago, St. Louis, Washington, Boston, San Francisco, Cleveland, Detroit, Pittsburgh, Houston, Birmingham, Norfolk.

BLW THE BALDWIN GROUP **BALDWIN**

FORGINGS AND CASTINGS

"STANDARDIZE ON STANDARD" FOR YOUR FORGINGS AND CASTINGS

Fuel costs reduced

66⅔% WITH GAS

Mr. C. D. Pruden, Vice-President and Manager, points out several additional advantages of GAS-fired ovens:

—***unexcelled uniformity of product***

—***increased production through rapid baking***

—***cleanliness of core-rooms***

—***safety of operation***

—***simplicity of controls***

MORE AND MORE...

THE TREND IS TO GAS

FOR ALL INDUSTRIAL HEATING

Photo by Despatch Oven Company, Minneapolis, Minnesota

Conversion to core-ovens fired by natural Gas has proved to be a profitable investment for the South Park Foundry and Manufacturing Company, South St. Paul, Minnesota. GAS-firing reduced fuel costs by two-thirds.

Conversion to Gas is a consistent trend in industrial and process applications because of these important, inherent features of GAS:

- **DEPENDABILITY**
- **FLEXIBILITY**
- **CONTROLLABILITY**
- **ECONOMY**
- **CLEANLINESS**

You will want to study facts and figures on applications of GAS in your building or modernization planning. The Industrial Representative of your local Gas Company has a wealth of useful information. He's as near as your telephone; he knows the answers.

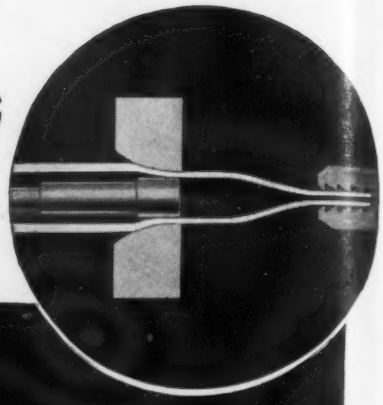
Visit the A.G.A.
Combined Industrial Gas Exhibit
NATIONAL METAL CONGRESS AND EXPOSITION
Atlantic City, November 18-22

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

5 BIG ADVANTAGES

when you use BONDERIZING AS AN AID IN DRAWING



1 REDUCES METAL-TO-METAL CONTACT

2 PROLONGS TOOL LIFE

3 PERMITS FASTER DRAWING SPEEDS AND DEEPER DRAWS

4 REDUCES MATERIAL BREAKAGE

5 GIVES SMOOTHER FINISH TO PRODUCT

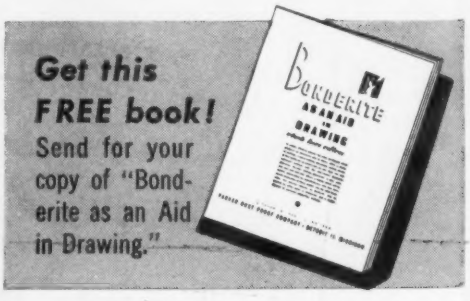
The same Bonderite coating which is used on so many products to guard against corrosion and finish failure is of remarkable value as an aid in drawing.

The Bonderite coating has a great affinity for oil. Even under high stresses, Bonderizing's phosphate crystals hold a uniform film of lubricant on the surface of the work.

The phosphate crystals of the Bonderite coating, part of the metal itself, stretch and are crushed in the drawing operation, providing a cushion between product and tools.

Bonderizing is a nonmetallic separating layer, aids greatly to prevent welding and galling.

For more efficient, more economical deep-drawing of steel, zinc-coated steel and aluminum, use Bonderizing.



PARKER RUST PROOF COMPANY, 2158 East Milwaukee Avenue, Detroit 11, Michigan

PARKER PRODUCTS CONQUER RUST

IN CONNECTION with your steel problems...

When the switchboard operator at Weirton makes your connection, you have a direct line to fast action on your steel problem. For Weirton is an integrated mill. Sales, metallurgy, production and shipping are closely coordinated "under one roof" to provide on-the-spot information, quick decisions, great flexibility of production.

Weirton's highly integrated operation enables us to give you faster, more specialized service on all the steels we make: Weirite, Weirzin, Weircoloy, Weiralead . . . hot and cold rolled strip, sheets and ternes . . . cold rolled spring steel . . . N-A-X High-Tensile.

WEIRTON STEEL CO.

WEIRTON, W. VA. Sales Offices in Principal Cities

Division of **NATIONAL STEEL CORPORATION**

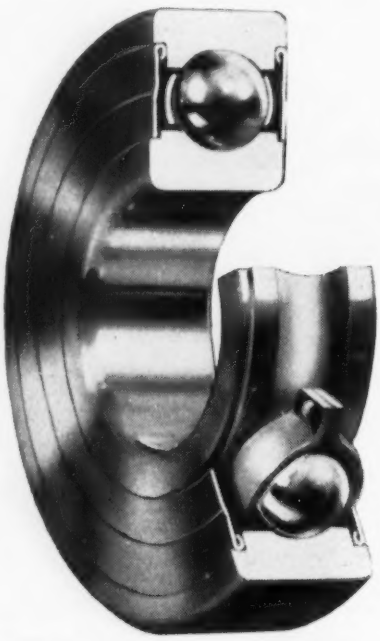
Executive Offices, Pittsburgh, Pa.

WEIRTON STEEL COMPANY

NATIONAL STEEL

Smooth Performance

WITH EVERY SCOOP



BCA Radial Bearing with double shield as supplied to Bay City Shovels, Inc. Keeps out dirt—seals in the lubricant.

THIS big and husky Bay City crawler shovel does a tough job in the rough and tumble construction industry. A vital factor in its ability to withstand incessant shocks and jolts is the sturdy construction of its BCA ball bearings. The smooth, reliable operation of BCA's prevents costly breakdowns . . . protects and extends the life of the equipment.

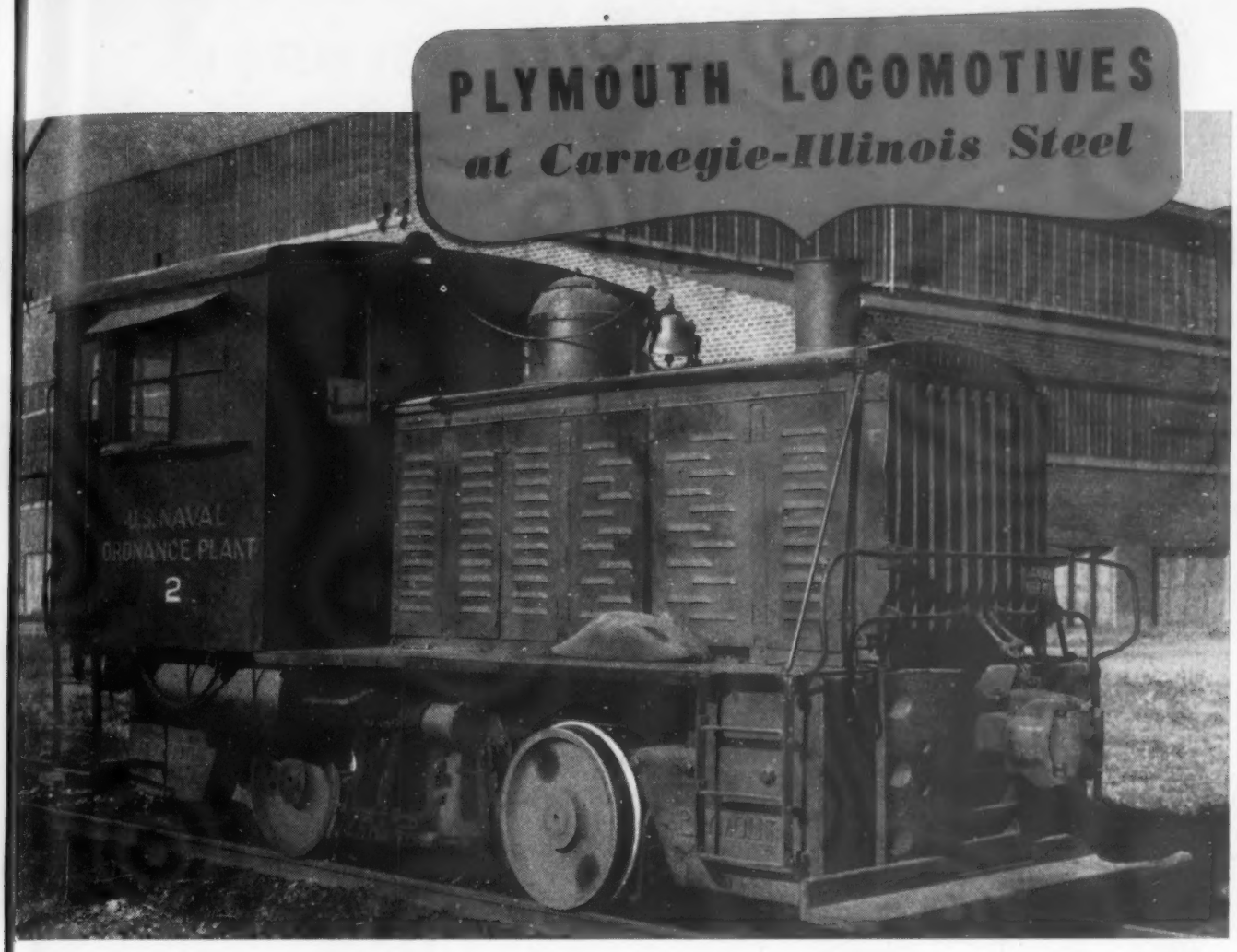
Every BCA ball bearing is engineered to high standards of exactitude . . . designed for specific conditions of speed and load.

BCA's engineers will be glad to study your particular requirements and recommend the right bearing for your needs.

BCA **BEARINGS COMPANY OF AMERICA**
LANCASTER, PA.

BCA

RADIAL • ANGULAR CONTACT • THRUST
BALL BEARINGS



For two full years, this standard-gauge, gasoline-powered Plymouth Locomotive, operating on a 24-hour-a-day schedule, handled the general yard switching for the Carnegie-Illinois Steel Corporation at the U. S. Naval Ordnance Plant, South Charleston, West Virginia.

Now in its seventh year of service, this locomotive is being used for intraplant service, hauling products between operations and from building to building within the plant. The excellent performance record of this Plymouth at Carnegie-Illinois is matched by hundreds of other Plymouths now providing economical, dependable intraplant transportation in every type of industry.

Intraplant haulage, a major phase of any production operation, offers countless opportunities to lower production costs and increase output. You'll be interested in the Plymouth story, available without obligation.

TRACK HAULAGE IS
CHEAPER HAULAGE

PLYMOUTH LOCOMOTIVES

GASOLINE, DIESEL MECHANICAL AND DIESEL ELECTRIC

PLYMOUTH LOCOMOTIVE WORKS • Division of The Fate-Root-Heath Co., Plymouth, Ohio, U. S. A.

SURPLUS unused

tubing

FOR IMMEDIATE SALE

Standard and Non-Standard O. D.'s and Wall Thicknesses
Range of Sizes from ¼" to 7"

Types: Carbon, Alloy, and Some Stainless; Both Welded and Seamless.

Price: ALL TO BE SOLD ON FIXED PRICE BASIS, F.O.B. LOCATION.

Delivery: Subject to Arrangement at Time of Sale Between Buyer and Regional Office Having the Stock.

Where to buy: Write, Wire or Phone Your Nearest War Assets Regional Office Below, indicating the type, size and specifications in which you are interested.

Orders received by 5 P.M. November 4, 1946 will be filled in the following sequence, as provided by law; (1) Certified veterans of World War II; (2) Subsequent priority claimants in proper sequence; (3) Non-priority purchasers.

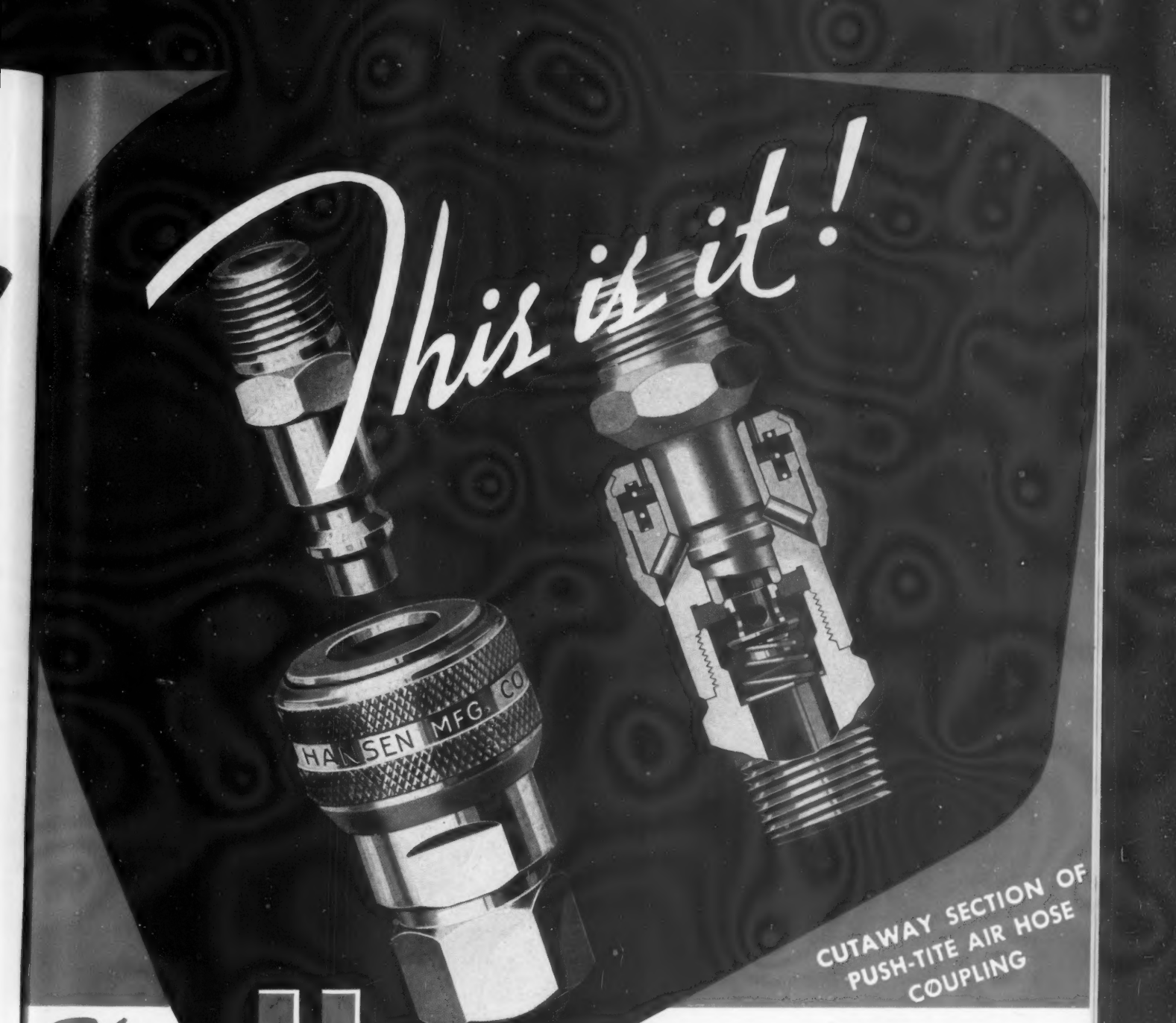
Veterans of World War II should apply to their nearest War Assets Administration certifying office for certification; the case number shown on certification and the location of the certifying office must be stated in a veteran's offer to purchase.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

157-7



CUTAWAY SECTION OF PUSH-TITE AIR HOSE COUPLING

The MARKABLE HANSEN PUSH-TITE COUPLING

remarkable Hansen Push-Tite Coupling has
top honors as the outstanding coupling on
market based on its performance—economical
formance. That is the reason why there are
e Hansen Couplings used by large and small
ufacturing plants than any other coupling. Its
plicity in design, ease of operation, "air savings"
long trouble free life means speed, increased
duction coupled with economy all along the line.

nsen Push-Tite Coupling is unique in that it is
y and fast to operate, just a slight push of plug
socket—it's connected, locked and air is auto-
ically turned on. Slide sleeve back with thumb
it is unlocked, disconnected and air is automatically shut off. There is no turning, adjusting or twisting of parts in order to connect, disconnect or to turn air on or off. It's all done by an easy push on plug to connect and a slight push on sleeve to disconnect. Complete swivel action prevents kinking of hose. Hansen Couplings will handle pressures from a few ounces to over 10,000 pounds without leaking.

Hansen Push-Tite air hose couplings are used for air, oil and grease. There are also other Hansen Couplings made to handle gasoline, acetylene and oxygen.

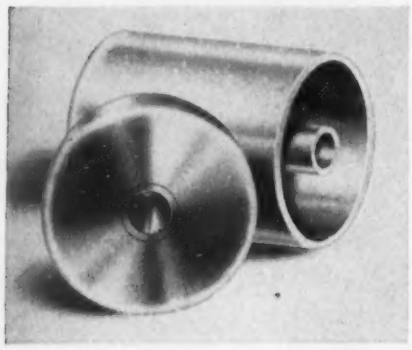
nd for FREE INDUSTRIAL CATALOG

HANSEN MANUFACTURING CO
1786 EAST 27th STREE
CLEVELAND 14 OHIO

Lepel Spark-Gap Converters AT WORK

NO. 2

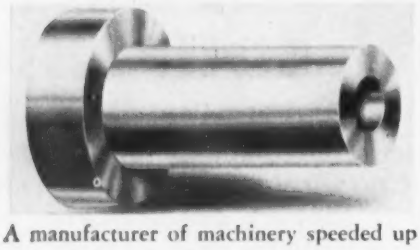
SILVER SOLDERING
SIX ASSEMBLIES AT ONE TIME



Faced with a need for speeding up the silver soldering of a cup-and-tube assembly, one manufacturer called in Lepel engineers. Induction heating coils were designed to join six assemblies simultaneously. Jigs were designed to hold the prefluxed parts of the assembly and the silver rings in position for soldering.

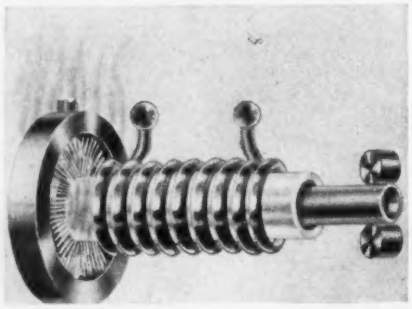
Automatic control permits the operator to assemble parts for another group of six in a duplicate heating station while the first six is being heated, at the rate of 1 every 5 seconds, to the proper soldering temperature, using a 15 KW unit. Metal discoloration, soldering time, and cost were reduced to a new low.

SPEED-UP OF A SHRINK-ON

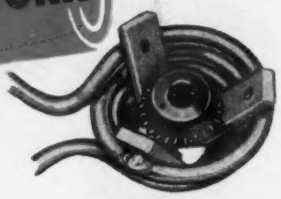


A manufacturer of machinery speeded up a shrink-fit operation by applying his Lepel Induction Heating Unit to the job. The collar to be shrunk onto the tube was placed in a suitably designed load coil, and heated for a few seconds. Then the tube was inserted and the assembly allowed to cool. This is only one of the 25 operations performed by Lepel units in this one plant, which result in a saving of over 50,000 man-hours annually.

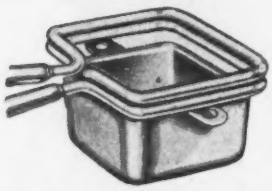
HARDENING STAINLESS-STEEL TUBING —
TEN FEET A MINUTE, WITHOUT DISTORTION



A stainless steel tubing is heated to about 2000° F and quenched in water for hardening. A tubing company is hardening such tubing at average rates of from 8 to 10 feet a minute. Heart of the automatic machine which performs this continuous heat-treating operation is a Lepel High-Frequency Induction-Heating Unit. A pair of rollers feed the tubing through a suitable heating coil and from there to the quench. One important result of this method of hardening is elimination of distortion, always a difficult problem in heat-treating.

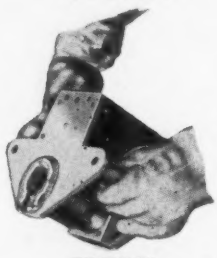


HARDEN

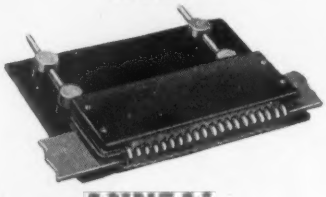


SOLDER

BRAZE



MELT



ANNEAL
STRESS RELIEVE
PREHEAT
NORMALIZE

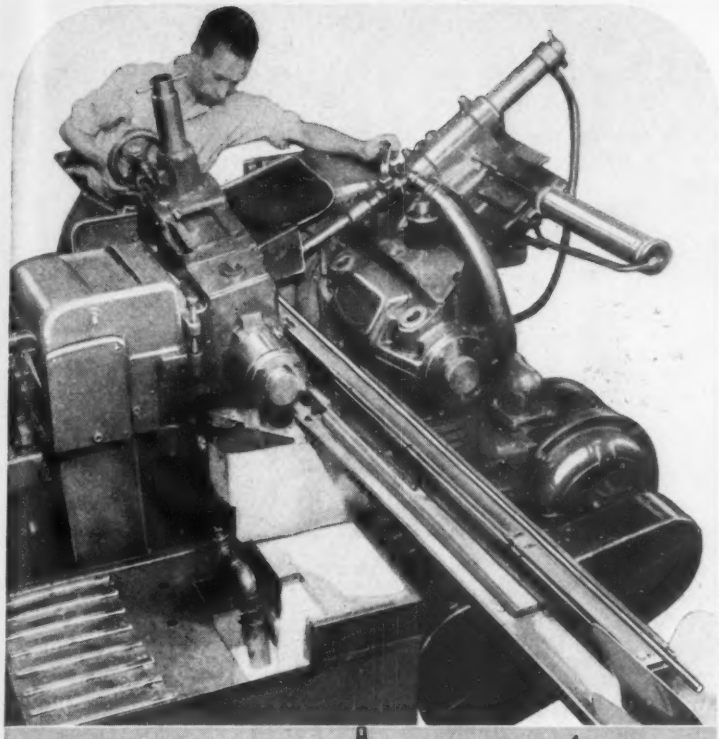
. . . ferrous and non-ferrous metals with the *SAME* Lepel unit

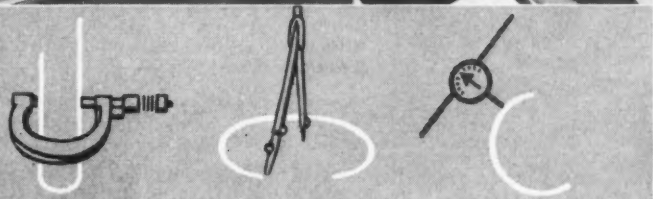
IF YOU HAVE A PROBLEM in joining, heat treating or melting of ferrous or non-ferrous metals, chances are that some Lepel High-Frequency Induction Heating Unit can help you do a better, faster, more economical job. Lepel metallurgists and field engineers will be glad to make a thorough study of your specific problem, and help you put the right compact, Lepel unit on the job. Just call, or write, Lepel High Frequency Laboratories, Inc., 39 West 60th Street, New York 23, N. Y.

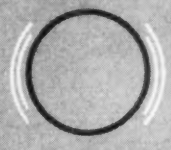
Note: Our new catalog is just off the press. Send for it.

PIONEERS IN INDUCTION HEATING

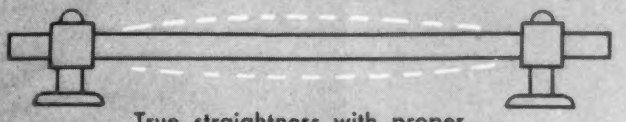
Lepel
High Frequency
INDUCTION HEATING UNITS







True roundness in a shaft is a factor in reducing vibration and wear in the bearings.



True straightness with proper spacing of supports helps to eliminate "whip" in shafts.

FOR PRECISION CONSTRUCTION

B&L GROUND SHAFTING

"A machine is as good as its shafting" . . . and the first step in building true-running, long-wearing equipment is the use of B&L GROUND SHAFTING . . . the aristocrat of its class.

The smoothness, roundness and accuracy developed by centerless grinding make it easier for you to reach precision standards in your own product . . . whether it is a delicately balanced mechanism or a high-speed, heavy-duty type of equipment.

For the general run of machine shafts and line shafting, there is available B&L Cold Drawn Rounds, Drawn and Ground or Turned and Ground Bars. Where the parts are exposed to view, as in machinery for display purposes, you can use either Drawn, Ground and Polished or Turned, Ground and Polished Shafting, which gives a mirror-bright surface finish.

Heat Treated or Strain-Tempered bars may be specified when higher physicals are required in shafting used in special heavy-duty applications.

BLISS & LAUGHLIN, INC.

HARVEY, ILL. • BUFFALO, N. Y. • MANSFIELD, MASS.

Sales Offices in all Principal Cities

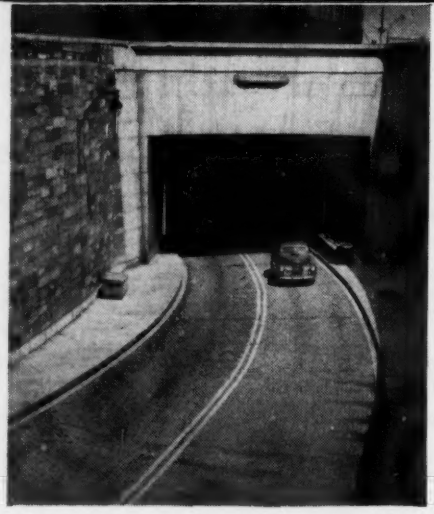
COLD FINISHED STEEL AND SHAFTING

LONGEST VEHICULAR TUNNEL IN TH

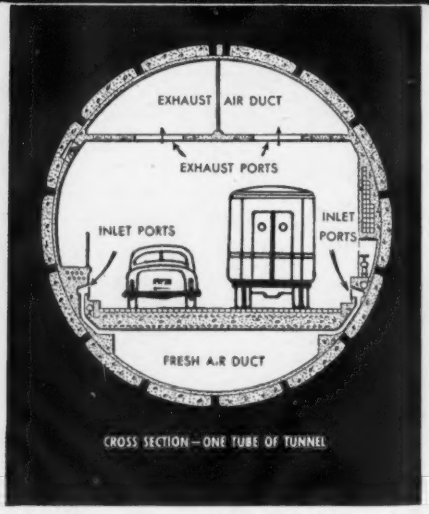
1. HERE'S THE SITE of the Brooklyn-Battery Tunnel—from Manhattan, to Governors Island, to Brooklyn. More than a mile and a half long, it will require equipment capable of moving 24,000 tons of air per hour. For a project of this magnitude, it's only natural that Sturtevant should supply the ventilating fans. The name "Sturtevant" has been associated with tunnel ventilation from the very beginning. For example:

11 OF THE 14 MAJOR VEHICULAR TUNNELS IN THE UNI
ARE VENTILATED WITH STURTEVANT FAN

2. THE HOLLAND TUNNEL—first project of its kind, and at that time one of the great engineering wonders of the world—is completely ventilated by Sturtevant. Completed in 1927, this 8,368-foot tunnel was equipped with a total of 92 Silentvane Fans. Since then, much experience has been gained in the efficient ventilation of under-water tunnels of this type.



3. IN THE QUEENS-MIDTOWN TUNNEL, completed in 1940, it was found that ample ventilation could be supplied by a total of 46 fans—23 blowers and 23 exhausters. This 6,343-foot tunnel under the East River, is also completely Sturtevant-ventilated. The Holland, Lincoln, Queens-Midtown and Brooklyn-Battery Tunnels all utilize the "distributive" method of ventilation. Here's how it works:



CROSS SECTION—ONE TUBE OF TUNNEL

4. The spaces above and below the tunnel roadway serve as air ducts. Fresh air, supplied by blower fans, is discharged from the duct below the roadway, through openings distributed along its entire length. Air and fumes rise to the ceiling, are drawn out by exhaust fans, through the return duct above the road. The system must be *completely dependable*, year in and year out. That's why—

HEATING • VENTILATING • AIR CONDITIONING •

DRYING • DUST AND FUME CONTROL • CONVEYIN

N THE U.S... COMPLETELY VENTILATED by STURTEVANT

E UNITED STATES
T FANS

53 Silentvane Fans just ordered for new Brooklyn-Battery Tunnel in New York City

SUPPLYING FRESH AIR for a vehicular tunnel—a restricted space far underground, filled with cars giving off toxic gases—is a project that almost staggers the imagination. The new Brooklyn-Battery Tunnel, for example—1.73 miles in overall length—will require a ventilating system capable of handling more than ten million cubic feet of supply and exhaust air per minute! 24,000 *tons* per hour! Yet, with 53 efficient, smoothly-running Sturtevant Silentvane fans providing the ventilation, the air *inside* the tunnel will actually be purer* than the air in a downtown Manhattan street.

We're proud of the fact that Sturtevant fans are to be used for this job — as they are in 11 of the 14 major vehicular tunnels in the United States.

HERE'S WHAT THIS MEANS TO YOU:

You're probably not building any tunnels this year—but chances are, you do have a problem that calls for good ventilation. Whether it's a small job requiring a single blower, or a large project that will need a central air-moving system—the same engineering skill and product quality back of this tunnel job, are at your disposal. Remember too, that as a Division of Westinghouse Electric, Sturtevant is the *only* manufacturing source that offers you the three basic types of equipment—for air moving, air conditioning and air-cleaning. Whatever your needs, Sturtevant is ready to serve you. B. F. STURTEVANT COMPANY, *Division of Westinghouse Electric,* Hyde Park, Boston 36, Mass.

5. Silentvane Fans, like the one being tested above, were selected for the Pennsylvania Turnpike's five tunnels, also for the Detroit-Windsor and Oakland-Alameda tunnels. Wherever air-at-work is being used today—you'll find fans by Sturtevant giving outstanding service.

**Average carbon monoxide content, for example, will be only about .04%, while street air may contain as much as 0.11% of this gas.*

3682-50

Sturtevant
REG. U.S. PAT. OFF.
Puts Air to Work

B. F. STURTEVANT COMPANY • DIVISION OF
Westinghouse
ELECTRIC

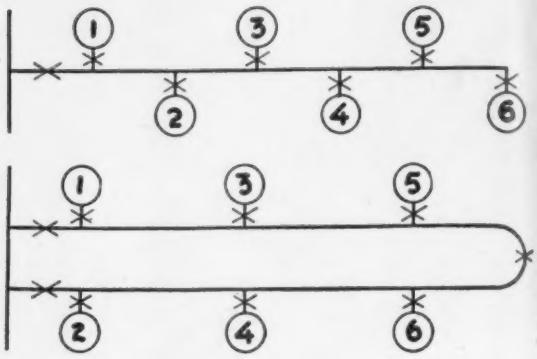
PRECIPITRON

MECHANICAL DRAFT

When he looped the header . . .

INSTALL STEEL PIPING
ADEQUATE FOR TOMORROW'S NEEDS

. . he halved his shutdown losses



PETE'S plenty happy, and for good reason. He just made a change in his lines that will save the Company real money. He simply looped and sectionalized the header that supplies six steam-heated kettles in his department.

Now, when something goes haywire, he can shut off the steam on one side of the loop, and keep production going on the other side until repairs are made. Result--shutdown losses cut 50%. All it took was a few dollars worth of pipe, welding flanges and turns, valves, insulation and labor. Anybody can see the value of that investment, when production is badly wanted the way it is now.

Ask Pete and he'll tell you it's long-run economy to install piping adequate to do a job, today or tomorrow.

Distributors in all industrial markets have Youngstown pipe in a wide range of sizes. For their names, write, wire or phone our nearest branch.

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

GENERAL OFFICES - YOUNGSTOWN 1, OHIO

Export Offices - 500 Fifth Avenue, New York City

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

Pipe and Tubular Products-Sheets-Plates-Electrolytic Tin Plate-Coke Tin Plate-

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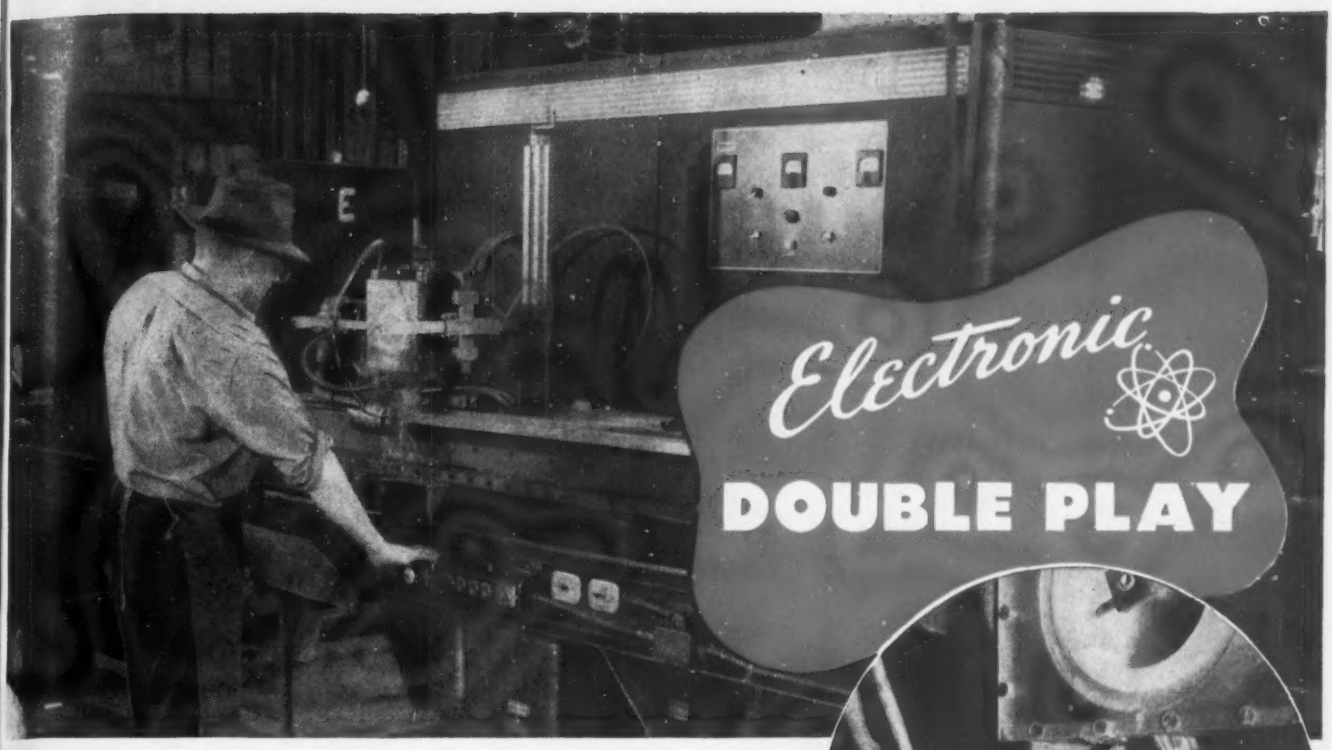
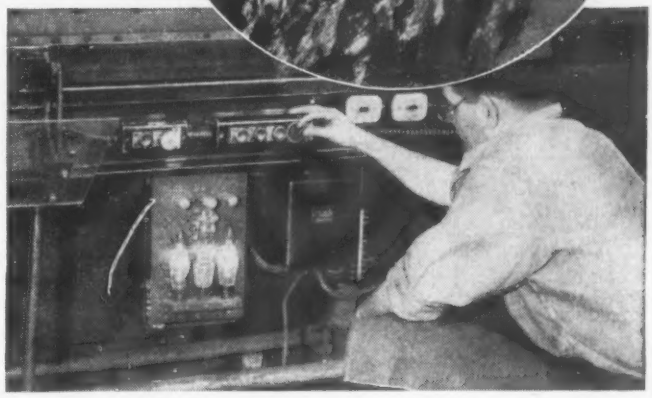


G-E ELECTRONIC HEATER and THY-MO-TROL DRIVE SOLVE DIFFICULT DIE-HARDENING PROBLEM

How could the wearing surfaces of brake dies measuring up to 20 feet in length be efficiently hardened? Because of the distortion difficulties due to the length of the dies, furnace hardening and salt-bath hardening were out of the question.—This was the problem referred to G-E engineers by the Dreis & Krump Manufacturing Company in Chicago.

After carefully analyzing the production requirements of this company, G-E heating specialists scored an electronic double play. The dies to be hardened are passed under the work coil of a G-E electronic heater by a G-E Thy-mo-trol-controlled carriage. Since the Thy-mo-trol drive equipment is connected into the plate circuit of the electronic heater, the speed of the carriage varies directly with the power output of the electronic heater. Thus, with this controlled carriage-speed and power-output ratio, the brake dies are hardened uniformly, with close depth control, and with minimum distortion. Also, Dreis & Krump are now producing a better product at a cost considerably lower than that of any other previous method of die hardening.

Perhaps your heat-treating operations could be similarly improved in speed, quality, and economy with G-E equipment and expert heat engineering. We shall be glad to furnish you with detailed information on G-E electronic heaters and to make specific recommendations for their application to your individual requirements. Just fill out and mail the coupon.



Brake-die wearing surface (above), passing under G-E electronic heater's work coil and into quench shoe for hardening.

Detail of electronic Thy-mo-trol equipment (below), for regulating carriage speed with heater's power output.

Apparatus Dept., Sec. A675-145
General Electric Company, Schenectady 5, N. Y.

My heat-treating problem is .....

.....

.....Please have a G-E heating specialist get in touch with me.
.....Please send me the following free bulletins:
GEA-4284A "G-E 5-Kw Electronic Heater"
GEA-4637 "G-E 20-Kw Electronic Heater"
GEA-4348 "G-E 50-Kw Electronic Heater"

Name .....
Company .....
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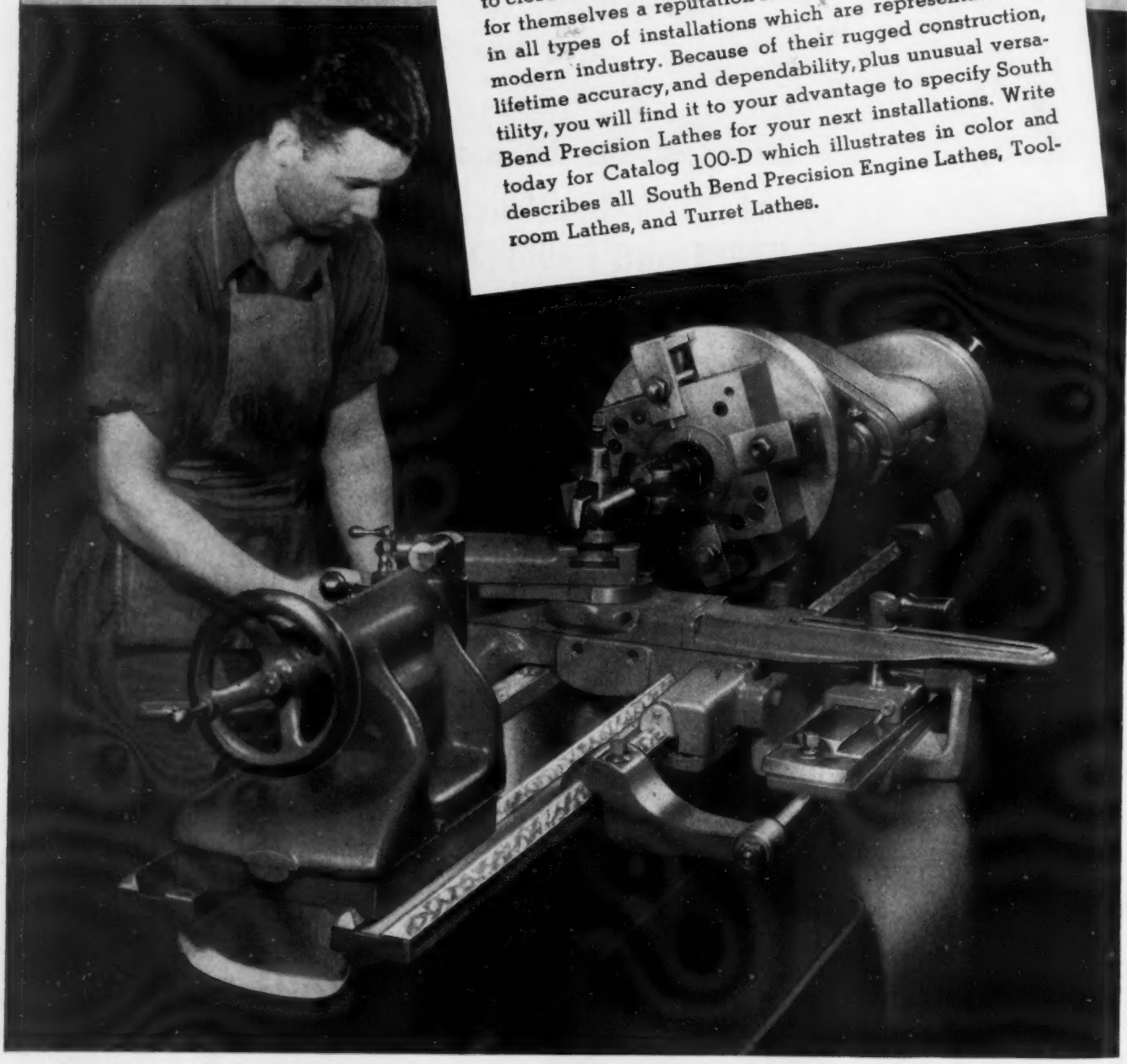
8744

GENERAL ELECTRIC

SOUTH BEND
Precision Lathes

RUGGED
ACCURATE
DEPENDABLE

The rugged construction of South Bend Precision Lathes is best demonstrated by the fact that the great majority of all South Bend Lathes ever made still are giving satisfactory service after years of daily use. Their rugged construction explains why, even after many years of service, they continue to produce toolroom and production work to close tolerances. It explains, too, why they have earned for themselves a reputation for dependable performance in all types of installations which are representative of modern industry. Because of their rugged construction, lifetime accuracy, and dependability, plus unusual versatility, you will find it to your advantage to specify South Bend Precision Lathes for your next installations. Write today for Catalog 100-D which illustrates in color and describes all South Bend Precision Engine Lathes, Toolroom Lathes, and Turret Lathes.



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429 EAST MADISON STREET • • SOUTH BEND 22, INDIANA

LATHE BUILDERS SINCE 1906

Always at your Elbow

...this *Republic* FOUNDRY EXPERT

When trouble crops up in your foundry—no matter what the cause—it's time to put through a phone call for the Republic Pig Iron Metallurgist. A skilled metallurgist with years of actual foundry experience, this man thinks and speaks in practical foundry terms.

Often, a single phone call is all that's needed for him to spot the cause and furnish the solution to a troublesome problem. If necessary, you'll find him ready at the drop of a hat to pay your foundry a trouble-shooting visit.

Of course, you need not be in trouble to profit from a visit by the Republic Pig Iron Metallurgist. He'll gladly make a survey of your operations if you are interested in finding new ways to increase production efficiency and unit output.

Remember that a call for the Republic Pig Iron Metallurgist places you under no obligation whatsoever.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic PIG IRON

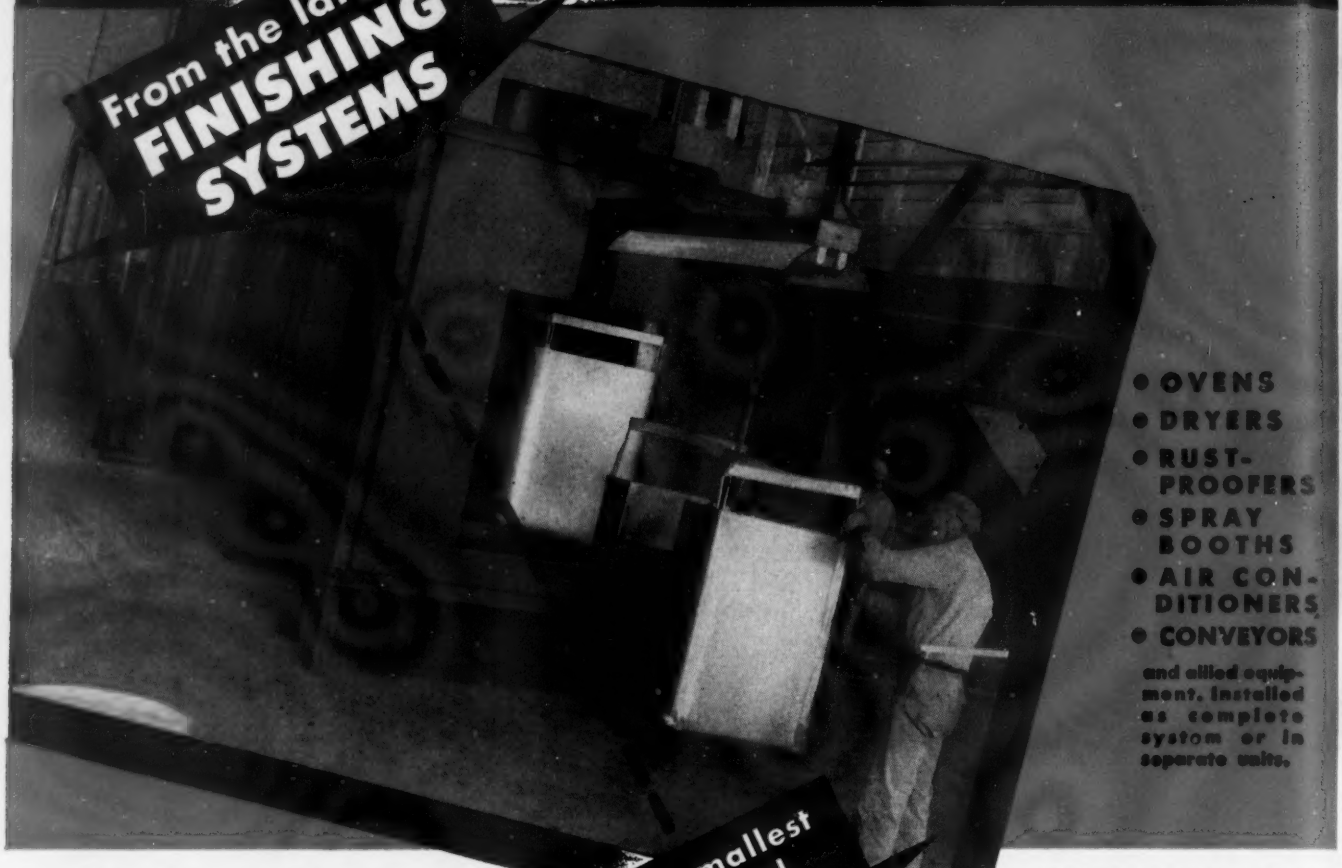
"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS

DESPATCH-*Engineered*

for GUARANTEED PERFORMANCE

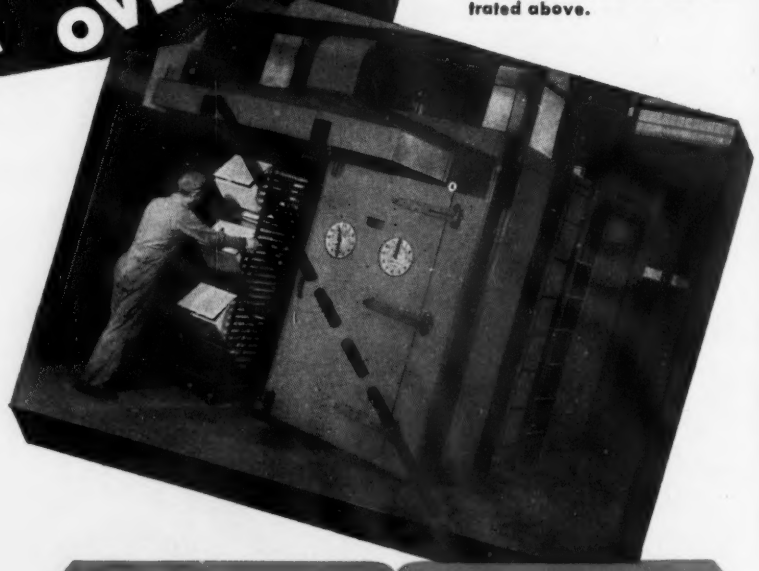
From the largest FINISHING SYSTEMS



- OVENS
- DRYERS
- RUST-PROOFERS
- SPRAY BOOTHS
- AIR CONDITIONERS
- CONVEYORS

and allied equipment. Installed as complete system or in separate units.

To the smallest individual OVENS



DESPATCH batch type Finish Baking Oven, elec. or gas. Engineered to same standards as other Despatch units illustrated above.

FOR 44 YEARS, as specialists in providing ultra-modern finishing equipment, DESPATCH has maintained a fixedpolicy of *engineering every installation, regardless of its size, to identical high standards.*

This means that the smallest DESPATCH baking oven is planned, sized and selected for your job by the *same* experienced engineering specialists who plan, design and install huge DESPATCH Finishing Systems. And your order is handled with the same painstaking care and attention to detail.

Thus you profit, even on the smallest individual unit, from years of accumulated experience and practical "know-how."

You will want the new Despatch brochure with specifications, photographs and layout of Finishing department for producing 600 deep freeze cabinets per 24 hour day.

Write today for your file copy.

DESPATCH OVEN COMPANY
617 S. E. 8th Street, Minneapolis 14, Minn.

WIRE or PHONE for Prompt Service to Your Finishing Department

DESPATCH
OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1

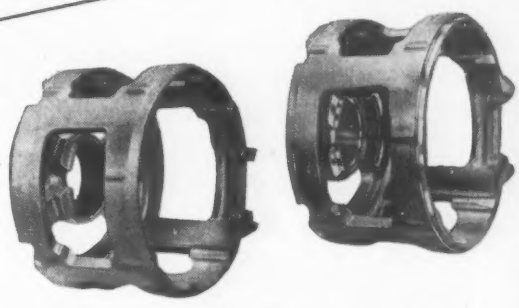
Automatic Feed Changing provides speed and accuracy on the FASTERMATIC

ppose you have a job like this—a fragile generator frame quiring the accurate machining of six different surfaces in e operation at four different feeds, each most suitable for the ecific cut. Here's another case where you can use the versatile stermatic to real advantage.

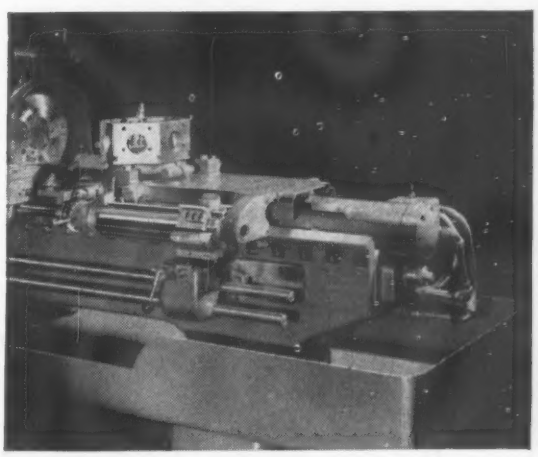
The operator merely loads the machine—quickly and easily—ing spring clamps instead of a chuck to avoid distortion. he Fastermatic does the rest, making the cuts and changing ur feeds—*automatically.*

It bores one hole to a tolerance of .0003" and holds all other equired dimensions—thanks to proper cutting speeds and eds. And it does the entire job in only 4½ minutes.

Whether your problem is a delicate part like this, or a rugged rging, you'll find the Fastermatic has the ability to do the b—faster, at lower cost. Write for complete information.



Generator frame before and after machining.

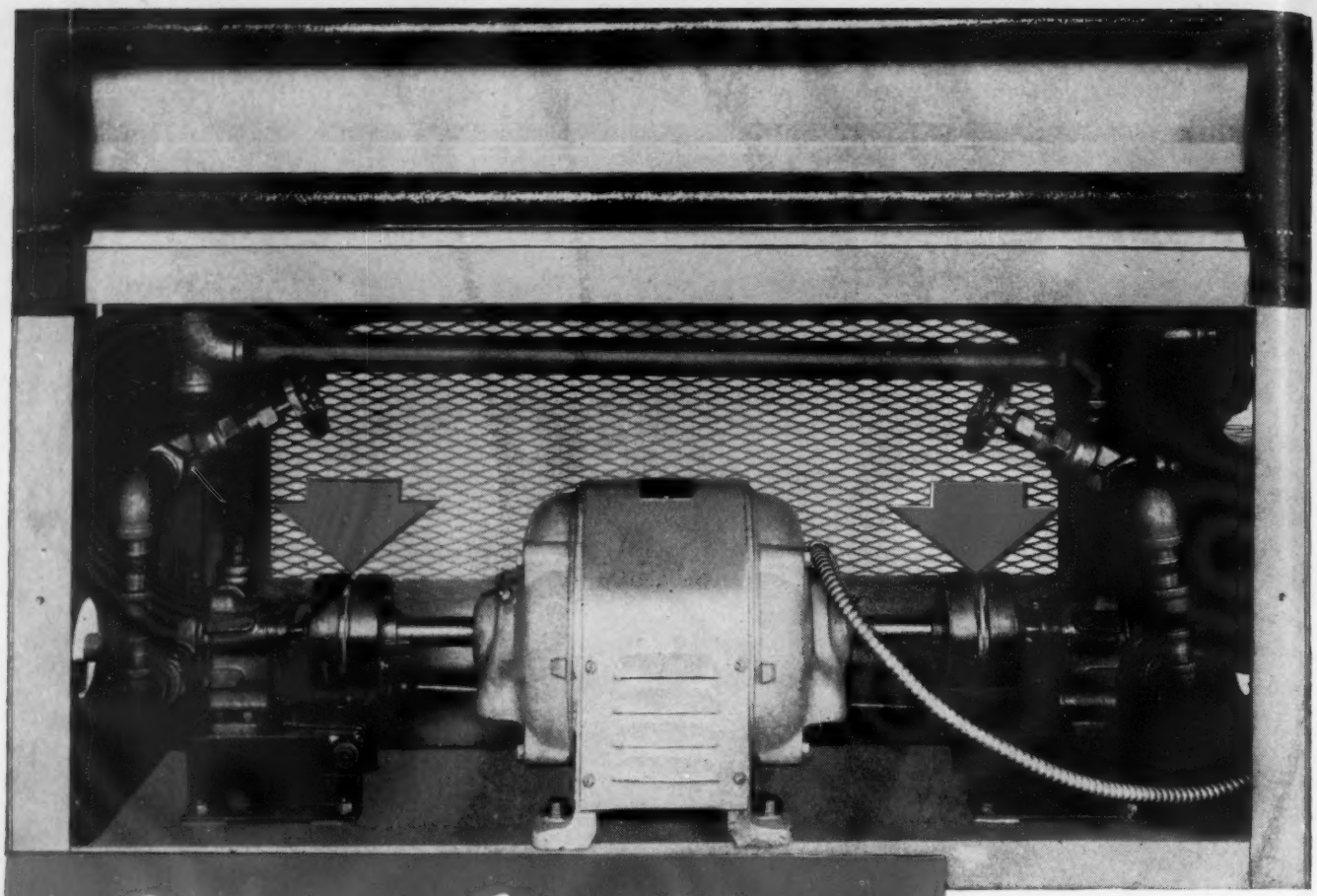


This cam drum on the hexagon turret carriage controls the feed for all operations automatically. Adjustment is fast and simple.

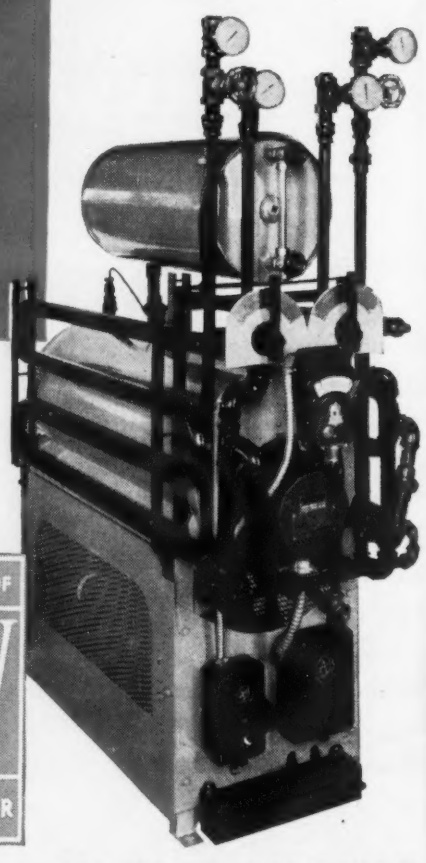
GISHOLT MACHINE COMPANY
217 E. Washington Ave. • Madison 3, Wis.
ook Ahead...Keep Ahead...with Gisholt

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



Modern Machines Deserve MORFLEX Couplings



John Royle & Sons, manufacturers of extrusion equipment, use Morflex couplings in the power drives of their temperature control units, which handle extruding temperatures of 90° to 500°.

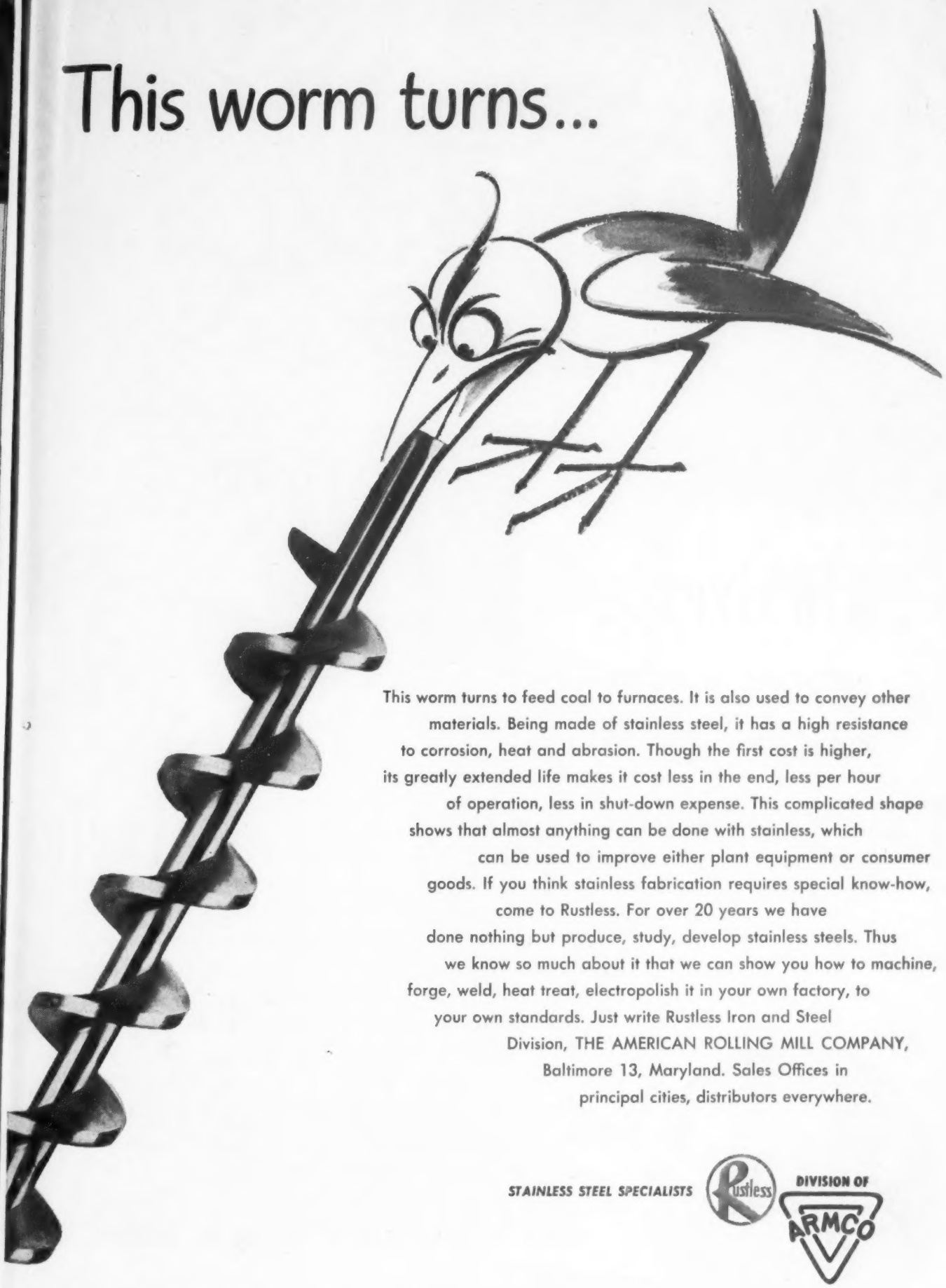
Morflex couplings require no lubrication, are unaffected by gas, oil, dirt or weather. The exclusive Morse-designed Neoprene biscuit cushions shock, isolates vibration and uneven impulses, *prolonging machinery life.* MORSE CHAIN COMPANY—Ithaca, N.Y.—Detroit 8, Mich.

Available in a wide variety of stock sizes

A PRODUCT OF B-W BORG-WARNER

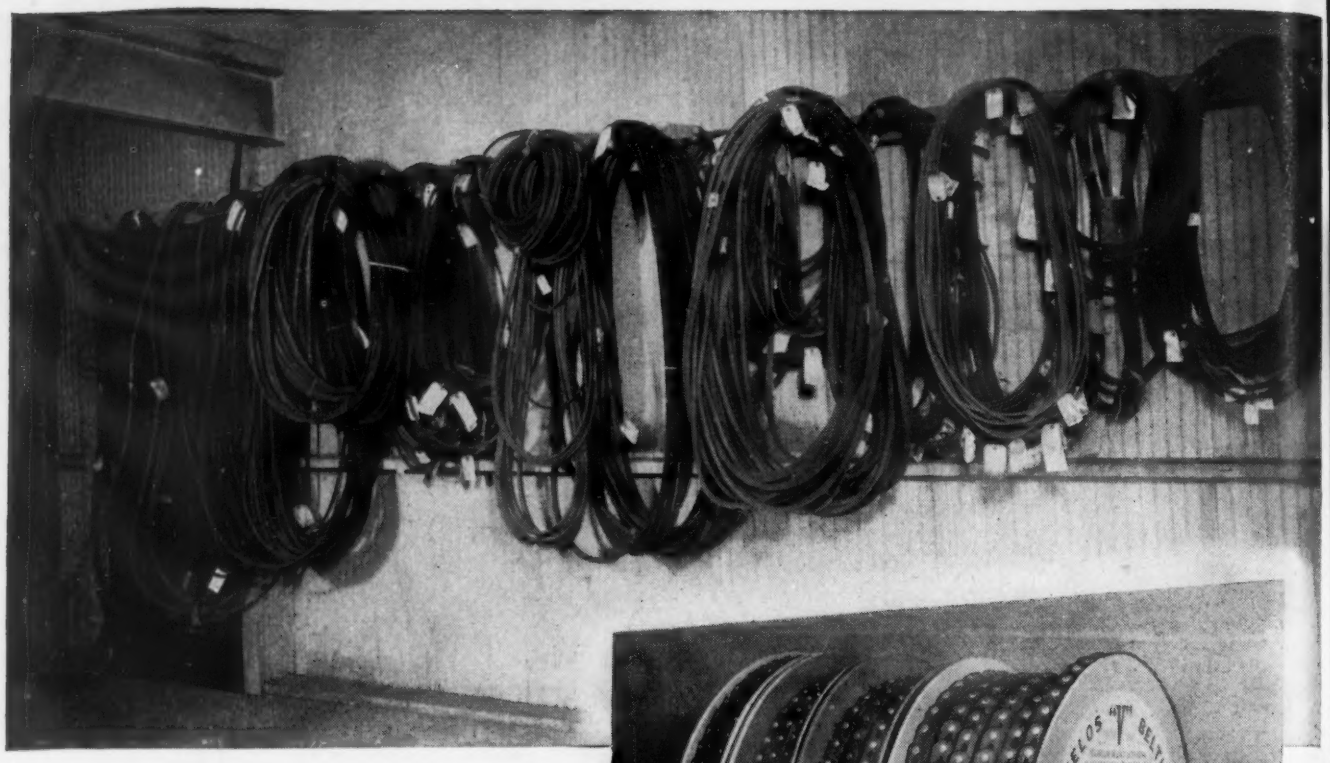
MORSE ROLLER and SILENT CHAINS and COUPLINGS

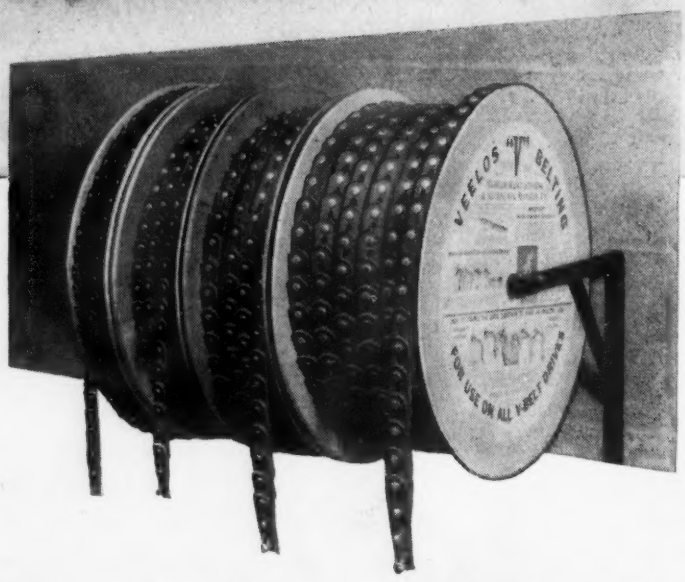
This worm turns...



This worm turns to feed coal to furnaces. It is also used to convey other materials. Being made of stainless steel, it has a high resistance to corrosion, heat and abrasion. Though the first cost is higher, its greatly extended life makes it cost less in the end, less per hour of operation, less in shut-down expense. This complicated shape shows that almost anything can be done with stainless, which can be used to improve either plant equipment or consumer goods. If you think stainless fabrication requires special know-how, come to Rustless. For over 20 years we have done nothing but produce, study, develop stainless steels. Thus we know so much about it that we can show you how to machine, forge, weld, heat treat, electropolish it in your own factory, to your own standards. Just write Rustless Iron and Steel Division, THE AMERICAN ROLLING MILL COMPANY, Baltimore 13, Maryland. Sales Offices in principal cities, distributors everywhere.

STAINLESS STEEL SPECIALISTS Rustless DIVISION OF ARMCO





316 sizes OF ENDLESS V-BELTS CAN BE Replaced with only 4 sizes of Veelos

FROM only four widths of Veelos—the link V-belt—you can make up 316 standard sizes of industrial and fractional endless V-belts. There's no need to stock spare sets of endless belts for each drive.

Large, costly inventories are eliminated... no deterioration of spare belts... no obsolescence.

Veelos on reels saves stockroom space... reduces inventory records... *is easy to locate and easy to install.*

Made in all standard sizes... fits all standard V-belt grooves ... available in standard 100-foot reels.

VEELOS
THE LINK
V-BELT

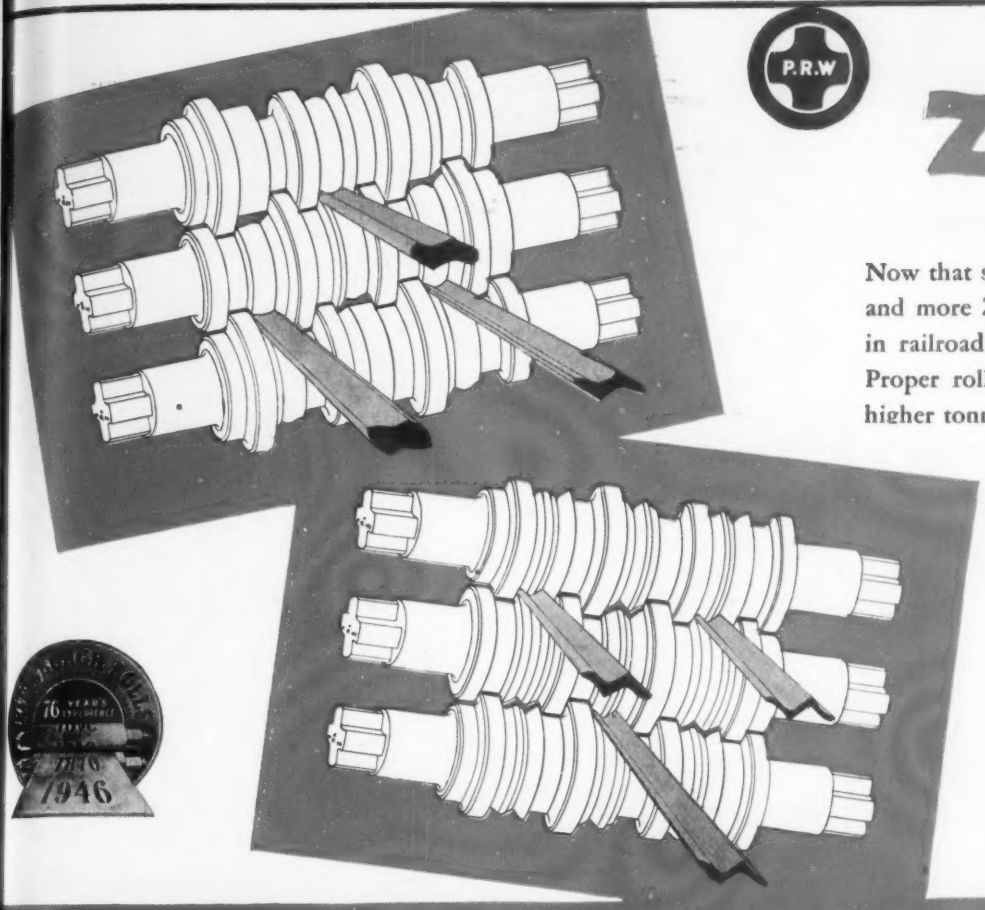
Adjustable to any Length
Adaptable to any Drive

MANHEIM MANUFACTURING & BELTING CO., MANHEIM, PA.

Tested • Proved • Adopted by American Industry

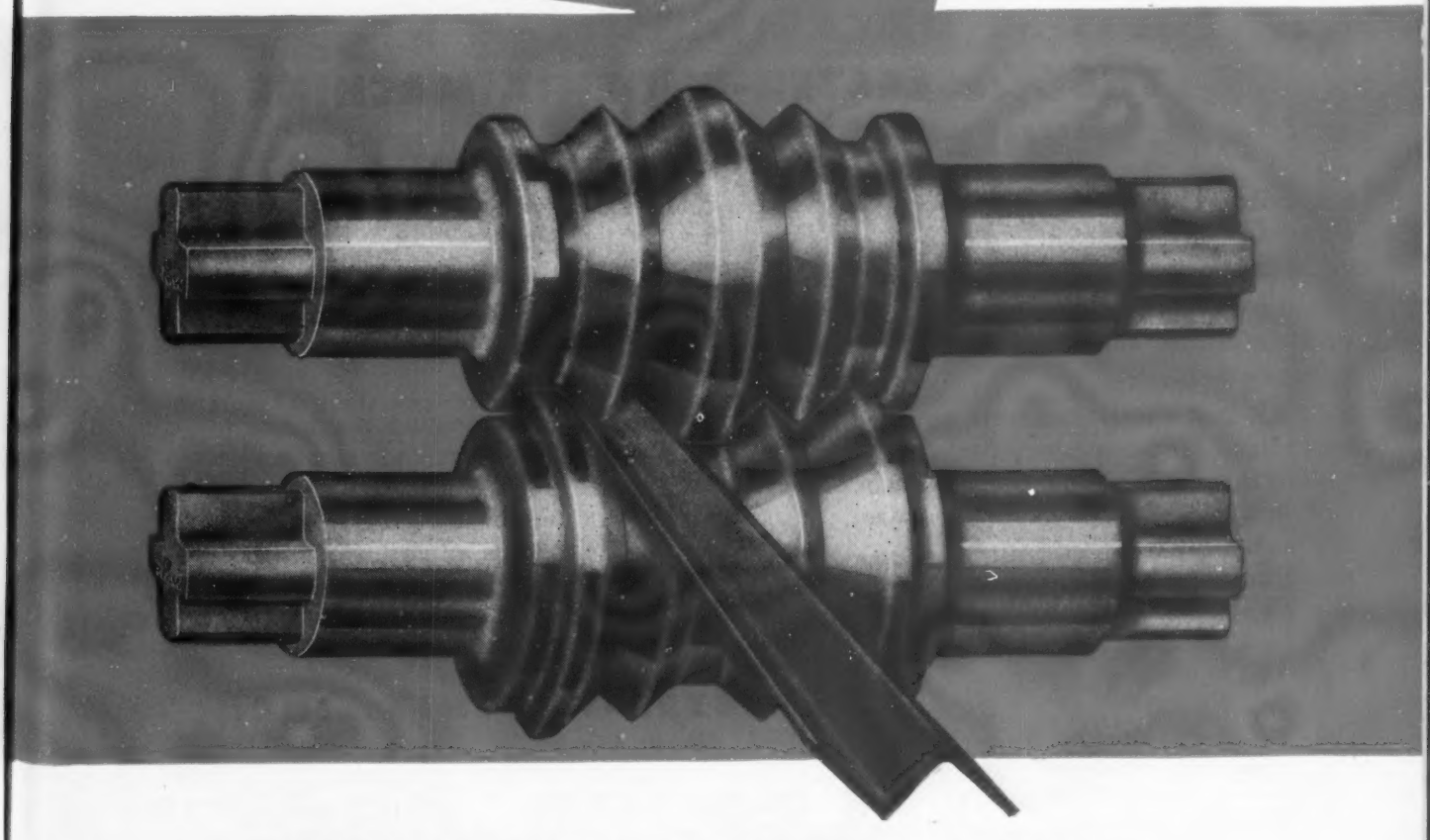
ROLLING TECHNIQUE . . .

Z BAR



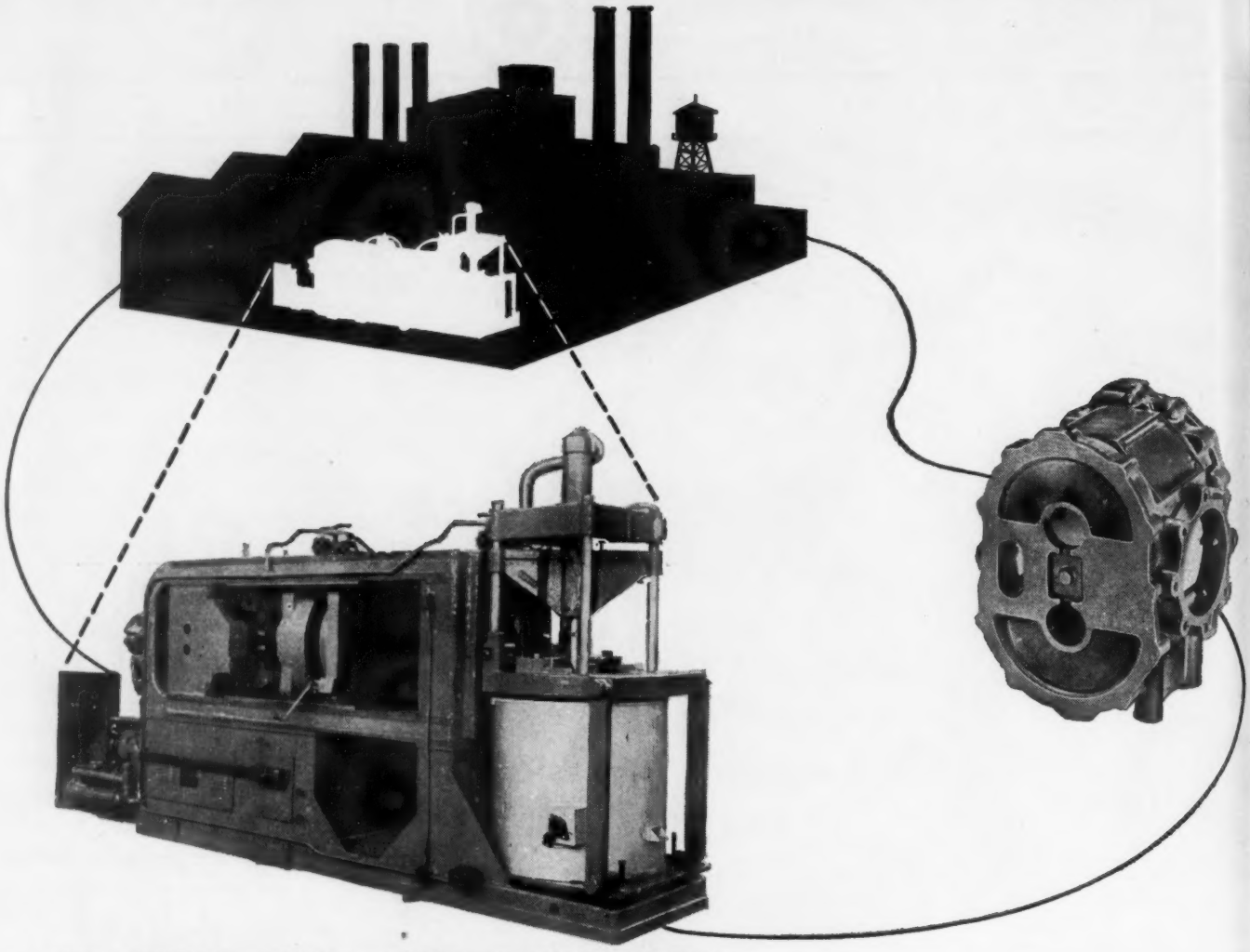
Now that steel is back in civilian use, more and more Z Bars will be rolled to be used in railroad cars, building construction, etc. Proper rolls will help greatly in obtaining higher tonnages with fewer roll changes and result in better quality steel being rolled.

Pittsburgh Rolls, with over three-quarters of a century of roll-making experience behind them, can be relied upon to deliver the production of highest quality for which high speed modern mills are designed, at *less cost per ton of steel rolled.*



PITTSBURGH ROLLS Division of Blaw-Knox Company PITTSBURGH, PA.

PITTSBURGH ROLLS



IF YOU USE DIECASTINGS*
THE *New* LESTER-PHOENIX MACHINE WILL FIT INTO YOUR PLANT!

Regardless of the metal you cast—brass, bronze, aluminum, tin, lead or zinc—there's a new LESTER-PHOENIX to fit your needs . . .

The new LESTER-PHOENIX line was built to answer questions LESTER engineers put to master diecasters during the war. Production men wanted greater strength, better controls, smoother castings with fewer rejects. Top management demanded lower costs . . .

LESTER met these demands and established new "firsts" in diecasting machines including: *First* one-piece cast alloy steel frame . . *First* pre-fill injection system applying up to 33,000 p.s.i. with slow squeeze until the casting chills . . *First* machine to specify 600 tons die-locking pressure . . *First* single crank die-height adjusting screw with supporting area equivalent to die area . . *First* mechano-hydraulic machine permitting exact adjustment of die opening . . LESTERS are made in 5 models in each of two types.

* or are thinking about them.

You are invited to write today for data on the new line of LESTER-PHOENIX machines.

LESTER-PHOENIX, INC.
2629 Church Avenue • Cleveland 13, Ohio

LESTER-PHOENIX
DIE CASTING MACHINES

15 YEARS OF RUGGED SERVICE. . . THAT'S THE RECORD OF

THIS BWH TRANSMISSION BELT!

Day-in and day-out for fifteen years, this tough BWH Transmission Belt has powered a Beater drive in one of America's great paper mills.

Made by the famous Rotocure process of continuous vulcanization – which eliminates potential trouble spots and increases operating life – this belt proved it could take it . . . under high stress . . . difficult operating conditions . . . and on peak load starting.

The success stories of BULL DOG Transmission Belts are matters of record in ore-crushing, refinery, paper, lumber, and textile industries . . . to name a few. So look to BWH for dependable ruggedness . . . BWH distributors for dependable service!

HAVE YOU A JOB WHERE STAMINA COUNTS?
Bring us your toughest problems . . . we're specialists in solving them. Consult your nearest BWH distributor, or write to BWH direct.

BOSTON WOVEN HOSE & RUBBER COMPANY

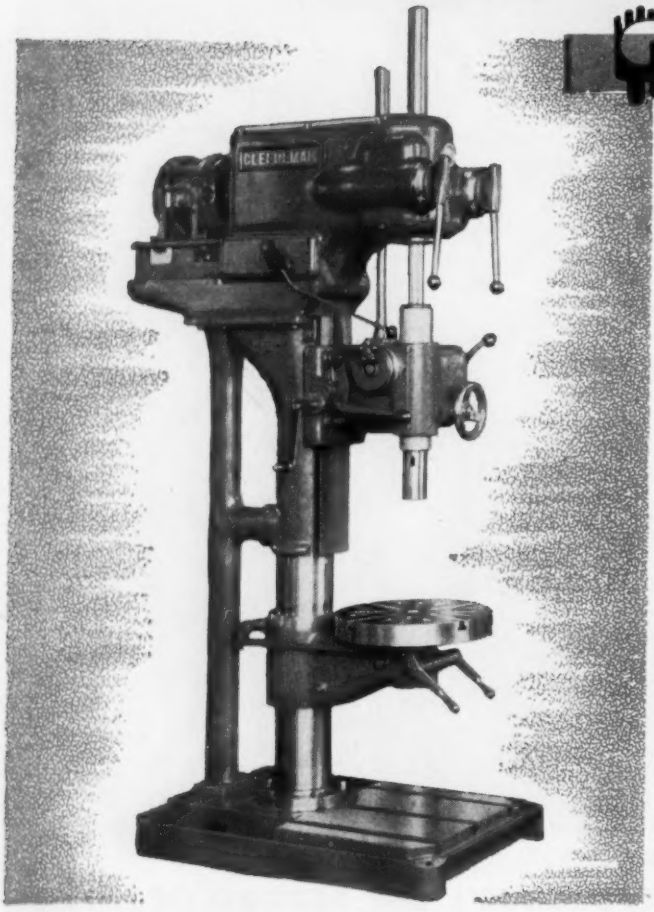
Distributors in All Principal Cities

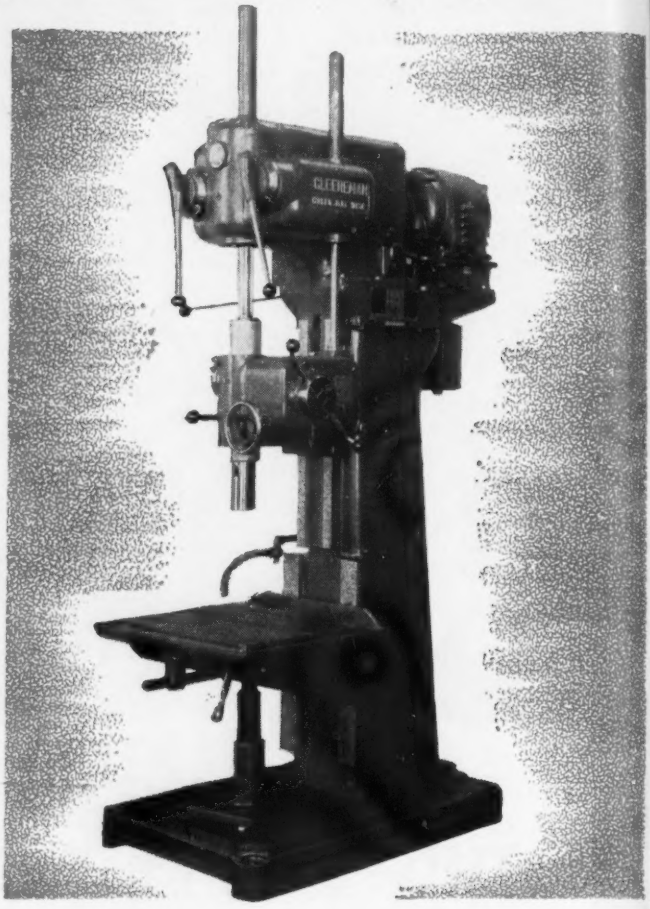
WORKS: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

ACCURACY

SPEED

ADAPTABILITY





All within Arms Reach on

CLEEREMAN DRILLING MACHINES

Attention to every detail in design and construction makes Cleereman Drilling Machines unsurpassed for speed, efficiency, accuracy, adaptability and long working life. All major controls are within arms' reach of the operator to improve the efficiency of operation—which means *more* pieces, in *less* time, at *lower* cost! Write today for catalogs giving complete description and construction details of Cleereman Round and Box Column Sliding Head Drilling Machines.

Cleereman Machine Tool Co. of Green Bay, Wisconsin, organized in 1908 and affiliated with Bryant Machinery & Engineering Company, manufactures fine machine tools including Cleereman Precision Jig Borers and Cleereman Drilling Machines.

BRYANT
Machinery & Engineering Company

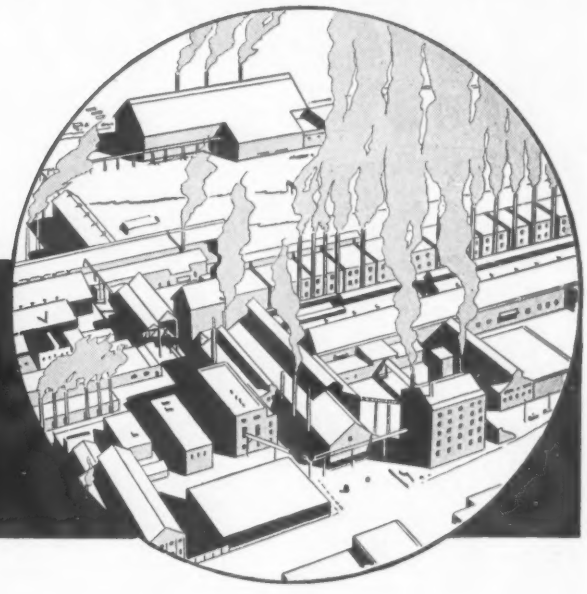
General Office
400 West Madison Street, Chicago 6
Representatives In Principal Cities

Grosso of Florence

Meant Fine Renaissance Ironwork

Even today, the finer quality of wrought iron work done by one of the greatest craftsmen of the 15th Century is identified with the phrase "by Grosso of Florence."

Granite City Means Finer Steel



At Granite City, facilities are large enough to permit the use of the most modern methods and equipment, yet small enough to insure scrupulous attention to your specifications in producing steel of finer quality . . . steel you will identify with the phrase "from Granite City."

Granite City Steel Co.

GRANITE CITY, ILLINOIS

Chicago • Cleveland • Houston
Indianapolis • Kansas City
Los Angeles

SINCE
GRANITE CITY STEEL
1878

Milwaukee • Memphis • Minneapolis • Moline • New York
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HOT ROLLED SHEETS • COLD ROLLED SHEETS • STRIPLATES • STAINLESS-CLAD • TIN PLATE • TERNE PLATE • ELECTRICAL SHEETS • TIN MILL PRODUCTS • PORCELAIN ENAMELING SHEETS

SHEET-STEEL

PROCUREMENT Facilitated by Caine's Specialized Service

One of Caine's important specialized warehouse services is that offered on sheet steel. Once again the benefits of specialization reflect themselves not only in the quality of the steel delivered, but also in the greater flexibility of the service offered. This service has been tuned to the needs of small as well as large users. Special shearing and slitting equipment enables you to secure special or exact sizes as readily as standard size sheets.

Some of the grades carried regularly in stock are: Hot Rolled, Cold Rolled, Galvanized, Enameling, Long Ternes, Uniform Blue, and Stainless.

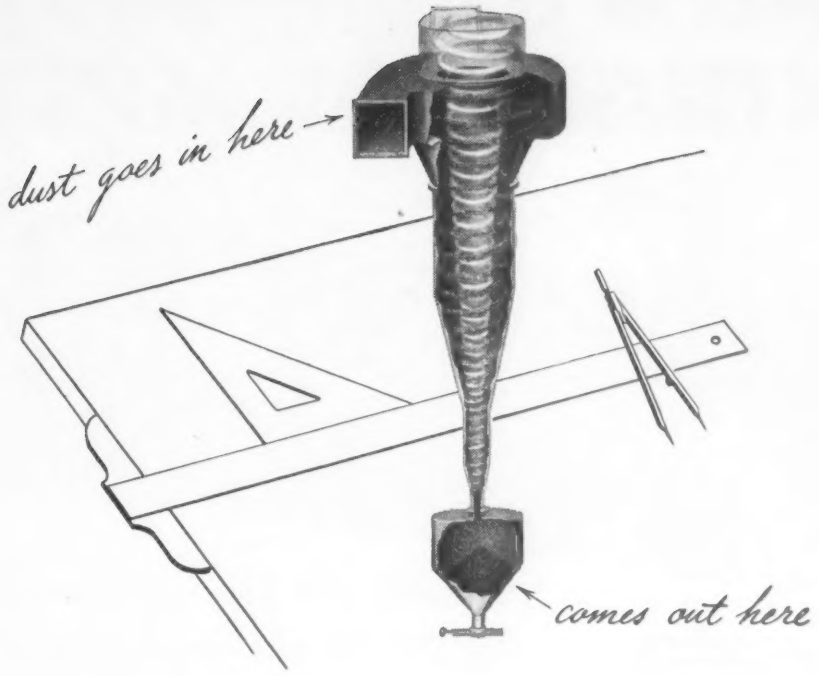
Caine Specialized Warehouse Service is worth investigation. Contact the nearest Caine Ware house or Office. They are located throughout the country for your convenience and profit

CAINE *Steel Company*

WAREHOUSE SPECIALISTS
in Sheets, Strip and Flat Wire

1820 North Central Avenue, Chicago 39, Illinois 1476

WAREHOUSES at Chicago, St. Louis, Minneapolis, Los Angeles, Oakland • **OFFICES** at Kansas City, Mo. and Grand Rapids, Mich.



Man-Made Tornado

Take any industrial plant that has a nuisance problem. Apply an American Blower Dust Collector. Presto! Your problem is solved. The man-made tornado action in these collectors does just this, easily and effectively.

Material can be separated from air or gases, too, in industries where it is worth salvaging, with these time-proved American Blower products. These collectors have already proved their merit collecting grain dust, coal dust, ore roaster dust, cement dust, soap dust, and a long list of other materials from air.

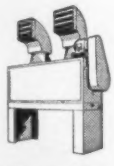
Phone your nearest American Blower Branch for information on putting these collectors to work for you. Ask also about the complete line of American Blower Air Handling Equipment and be sure to investigate Gyrol Fluid Drive for the smooth transmission of power and stepless variable speed control.

AMERICAN BLOWER

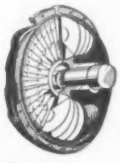
AMERICAN BLOWER CORP., DETROIT 32, MICH.

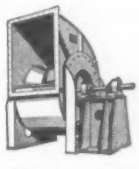
Division of American Radiator & Standard Sanitary Corporation

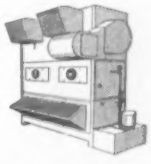
4 Years of War-Stimulated Improvement—On Top of 61 Years of Engineering Development


Heating Equipment

Ventilating Equipment


Gyrol Fluid Drive


Industrial Fans


Air Conditioners

FOR SALE or LEASE
COKING COAL MINES

GOVERNMENT OWNED
SURPLUS PLANTS

McAlester, Oklahoma (Plancor 1507)
Lone Star Steel Company
Sheffield Steel Corporation of Texas

The War Assets Administration invites proposals for the purchase or lease of the government owned coking coal mines and mining equipment described below. These facilities have been declared surplus and are offered for disposal subject to the rights of the former lessees.

MC CURTAIN MINES:

Estimated Annual Capacity: 435,000 tons. Site: Approx. 461 acres of surface land and approx. 2,938 acres of coal lands (surface land owned by others). Coal seam approx. 54″ in thickness, split by 2″ parting. Main slope and two partings.

Buildings: Rotary dump, washery, boiler house, shop, garage, offices, warehouse, etc.

Machinery and Equipment: Seven hoists, five battery type locomotives, coal loaders, conveyors, mine cars, rock drills, rotary dump, coal washer unit, air compressors, boiler, etc. Light and power from public utility company, water from San Bois Lake. Sewerage by septic tank. Kansas City Southern Railroad sidings on site. Paved road leads ¼ mile to State Highway No. 31.

CARBON NO. 4 MINE:

Estimated Annual Capacity: 215,000 tons. Site: Approx. 146 acres of surface land and approx. 2,336 acres of coal lands. Coal seam varies from 32″ to 38″ in thickness. Two slopes. Coal is hauled to Carbon No. 5 Mine (described below) for final washing and preparation.

Buildings: Hoist house, boiler house, wash house, etc.

Machinery and Equipment: Seven hoists, four battery locomotives, coal loaders, conveyors, mine cars, drills, mining machines, boiler, etc. Power and light from public utility company. Water from well and reservoir. Sewerage by septic tank. Mine is served by Missouri, Kansas & Texas Railroad. Paved road to State Highway No. 31 and 270.

CARBON NO. 5 MINE:

Estimated Annual Capacity: 215,000 tons. Site: Approx. 176 acres of surface land, 1,585 acres of coal land. The development consists of 4 portals, one haulage slope, one manway and two airways.

Buildings: Tipple, washer, surge bin, hoist house, boiler house, office warehouse, machine shop, etc.

Machinery and Equipment: Eight hoists, four battery locomotives, coal loaders, conveyors, mine cars, drills, mining machines, coal washing plant, air compressors, pumps, boiler, etc. Light and power from public utility company, water from wells on site. Sewerage by septic tank. Kansas City Southern Railroad sidings on site. Oklahoma State Highway No. 31, one-fourth mile distant.

Further information is available in the Kansas City Office of War Assets Administration. Listing of these mines by name of lessees is for identification only and has no connection with the lessees' own facilities. Information contained herein is not intended as a basis for negotiation. The War Assets Administration reserves the right to reject any or all proposals.

A cut-off date will be publicly announced later for the submitting of proposals. All proposals shall be sealed and in triplicate, with the following notation in the lower left hand corner of envelope: Sealed Proposal—Plancor 1507.

Credit terms may be arranged for the purchase of these facilities.

Address all inquiries and proposals to:

WAR ASSETS ADMINISTRATION

OFFICE OF REAL PROPERTY DISPOSAL

Troost & Bannister Road **Kansas City, Missouri** 769

STANDARDS and SPECIALS by the *Millions*

THE FERRY CAP & SET SCREW CO.

2159 SCRANTON ROAD • • • CLEVELAND 13, OHIO

"SHINYHEADS"
America's Best Looking Cap Screw

Made of high carbon steel—AISI C-1038—to standards for full finished hexagon head cap screws. Heads completely machined top and bottom. Hexagon faces clean cut, smooth and true, mirror finish. Carried in stock.

"HI-CARBS"
Heat Treated Black Satin Finish

Made of high carbon steel—AISI C-1038. Furnished with black satin finish due to heat treatment. Hexagon heads die-made, not machined. Point machine turned; flat and chamfered. Tensile strength 130,000-160,000 p.s.i. Carried in stock.

FILLISTER CAP SCREWS

Heads completely machined top and bottom. Milled slots—less burrs. Flat and chamfered machine point. Carried in stock.

FLAT HEAD CAP SCREWS

Heads completely machined top and bottom. Milled slots—less burrs. Flat and chamfered machine point. Carried in stock.

"SHINYLAND" STUDS

All studs made steam-tight on tap end unless otherwise specified, with flat and chamfered point. Nut end, oval point. Carried in stock.

SET SCREWS

Square head and headless—cup and oval point—case hardened. Carried in stock.

"SHINYTHREADS"
AIRCRAFT ENGINE STUDS

Made of highest aircraft quality alloy steel, finished to extremely close thread and body tolerance, with precision rolled threads—both straight and step types.

CONNECTING ROD BOLTS

Made of alloy steel—heat treated—threads rolled or cut—finished to extremely close thread and body tolerances—body ground where specified.

SPRING BOLTS

Case hardened to proper depth and ground to close tolerances. Thread end annealed. Supplied in various head shapes, with oil holes and grooves of different kinds, and flats accurately milled.

VALVE TAPPET ADJUSTING SCREWS

Hexagon head style—to blueprint specifications—hexagon head hard; polished if specified—threads soft to close tolerance.

STANDARDS carried by **LEADING DISTRIBUTORS**

SPECIALS furnished to **BLUE PRINT SPECIFICATIONS**

TO SAVE TIME AND COST
Simply Specify
"SHINYHEADS" NC or NF Thread | **"HI-CARBS"** NC or NF Thread

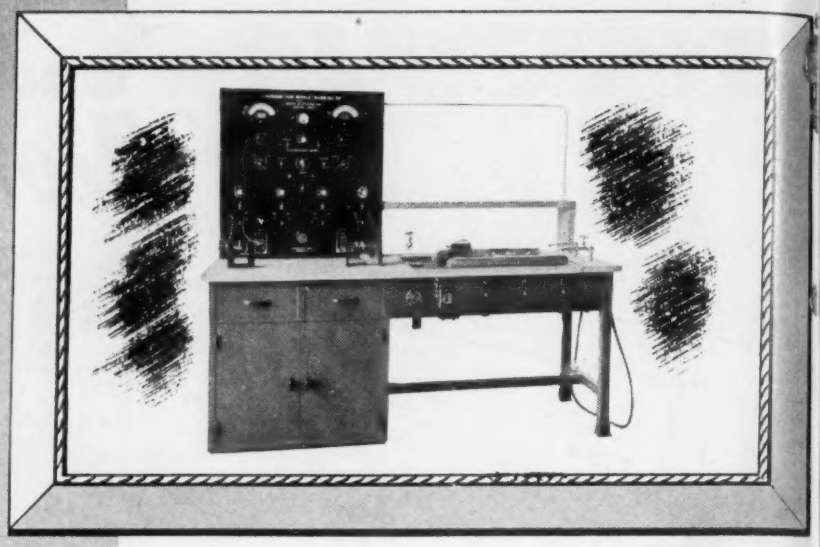
Pioneers and Recognized Specialists, Cold Upset Screw Products since 1907

WRITE FOR INFORMATION
• SEND FOR SAMPLES •

NOW...

A COMPLETE PLATING LABORATORY

in miniature



for routine solution control

for exacting research work

Chemical analysis of plating solutions is not enough—especially with today's high current density bright-plating processes. Alone, such analysis cannot fully indicate the quality of deposits that can be expected. As a supplement to chemical analysis, to enable platers to effect corrective measures that will eliminate faulty final deposits, H-VW-M has developed —and now offers—

THE DIGGIN ELECTROPLATING CONTROL TABLE

Test panels can be plated with this new scientific control instrument under closely regulated conditions. The result of additions, impurity removal treatments, and variations in operating conditions can be closely observed—using only a few hundred milliliters of electrolyte for the tests.

Above the alberene stone working surface of the Diggin Control Table, a 36 x 36 inch control panel provides all instruments and service outlets required for electroplating tests. Current is supplied by either generator or battery. Red and green lights and buzzer signal supplement the unit's electric timer. Outlet is provided for motor-driven stirrers, hot plates, immersion heaters, and other accessories.

Additional features include two compressed air outlets; separate cleaner-control elements, heated cells for hot electro-cleaning, hot pickling and rinsing, and three unheated cells for other processing. Two stainless steel ventilation casings withdraw vapors and fumes.

Here is one of the most important adjuncts to plating control—routine or experimental — to be introduced in recent years. Write to H-VW-M for particulars.

1755

HANSON-VAN WINKLE-MUNNING CO.
MATAWAN, NEW JERSEY
Manufacturers of a complete line of electroplating and polishing equipment and supplies
Plants: Matawan, New Jersey · Anderson, Indiana
Sales Offices: Anderson · Chicago · Cleveland · Dayton · Detroit · Elkhart
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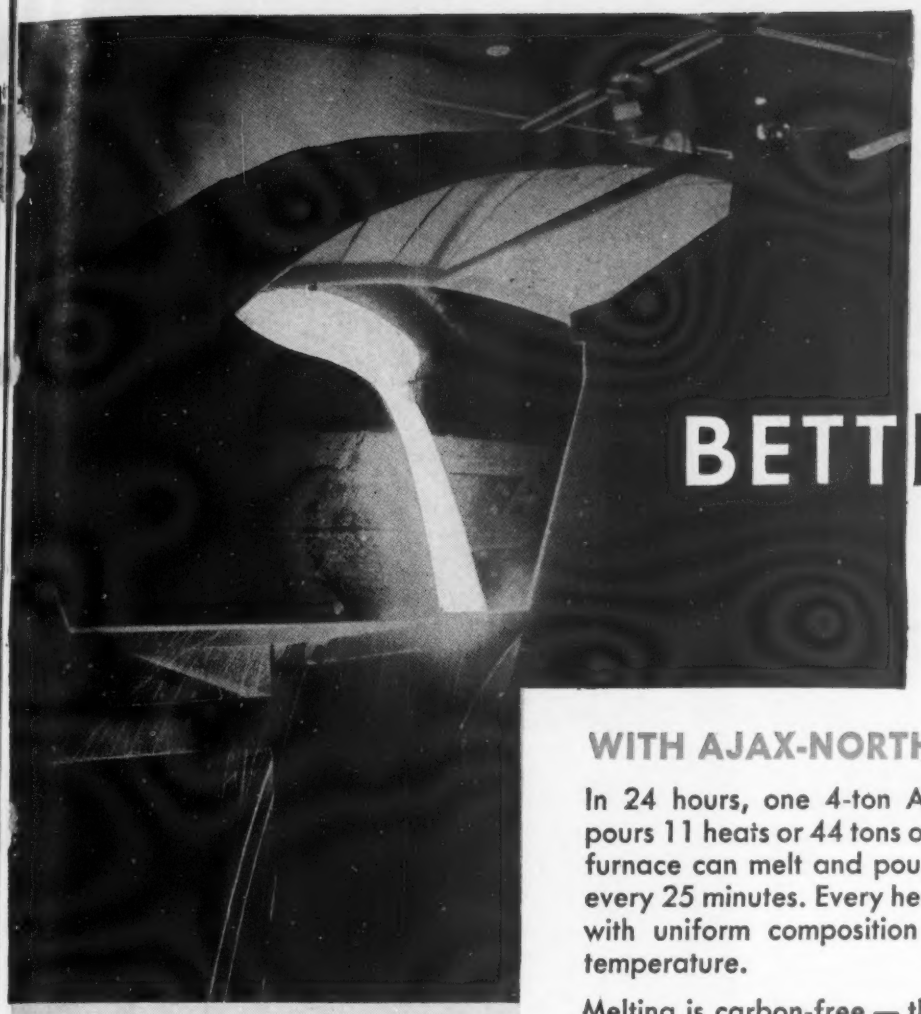


Three-ton Ajax-Northrup furnace pouring high quality alloy steel into a centrifugal casting machine

MAKING BETTER STEEL *faster*

WITH AJAX-NORTHRUP HIGH FREQUENCY

In 24 hours, one 4-ton Ajax-Northrup furnace melts and pours 11 heats or 44 tons of high-grade alloy steel! A smaller furnace can melt and pour a heat of 200 lbs. of tool steel every 25 minutes. Every heat will be of exact, clean analysis, with uniform composition and closely controlled pouring temperature.

Melting is carbon-free — there are no electrodes. It is ideal for nickel, chromium and other alloys. Electro-magnetic stirring assures uniform composition.

Melting costs are low — the Ajax-Northrup furnace is generally more efficient than other electric furnaces of corresponding size. Lining life is long. Relining is easy.

Put in Ajax-Northrup furnaces to handle your melting where speed, special alloys, quick change-overs or wide variations in size of melts are required. Most Ajax-Northrup users say "it's the only way." Capacities from 8 oz. to 8 tons, with converter or motor-generator power.

Send for informative Bulletin No. 27

Save on Scrap Recovery

Alloy scrap can easily be reclaimed with low loss in an Ajax-Northrup furnace. It's excellent for scrap having easily oxidizable elements.

86

AJAX NORTHRUP *Since 1916*

AJAX ELECTROTHERMIC CORP., AJAX PARK, TRENTON 5, N. J.

HIGH-FREQUENCY HEATING · MELTING

AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTRIC CO., INC. The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP., Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

ASSOCIATE COMPANIES

SPOT WELDERS

join metals fast!

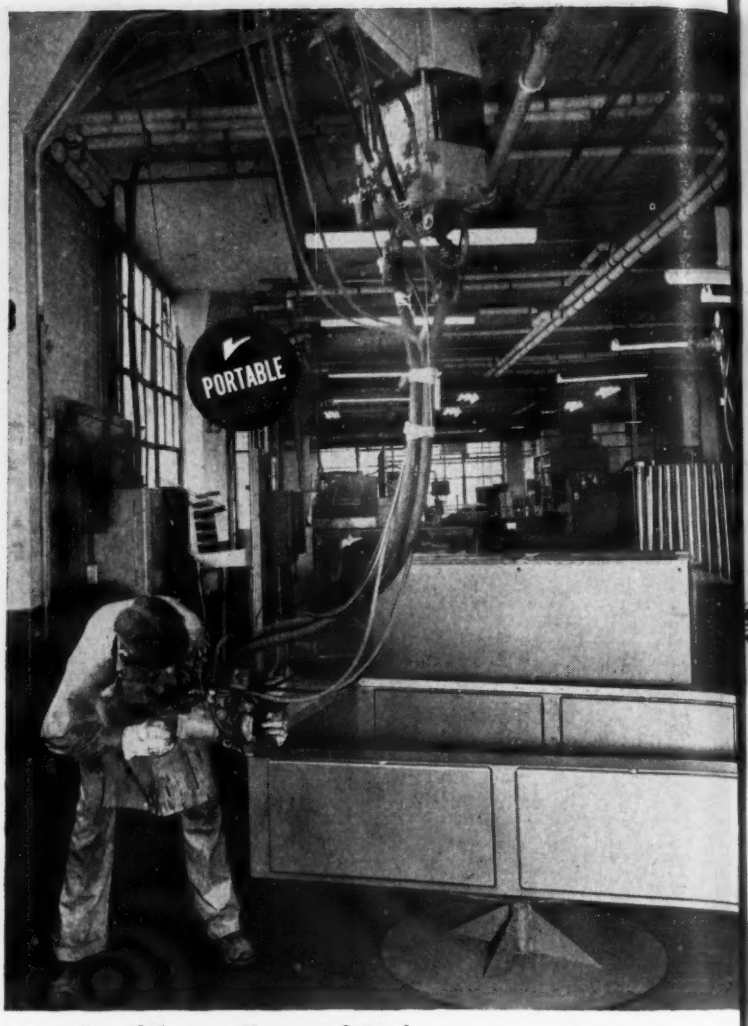
A spot weld gives you a joint as strong or stronger as the parent metal and you have nothing to wiggle loose. Equally important, one man with one spot welder can turn out hundreds of units every 8-hour turn.

Gun welders mean portability. The gun, attached to the transformer by flexible cable, can be moved from point to point on the job. When necessary, the transformer, too, can be made mobile. Used for bulky work . . . automobile bodies, refrigerators, sink cabinets, railway cars . . . where you can move the welder to the job easier than you can move the job to the welder. Taylor-Winfield has several hundred gun designs for every conceivable requirement.

The popular rocker arm type, a floor model, has ample throat clearance to accommodate over size or under size, as well as conventional size work. You can fabricate a variety of work in heavy or light gauges of any weldable material.

Spot Welding has outmoded many forms of fabrication. Taylor-Winfield can give you information you need on styles and sizes of spot welders and recommendations on how you can use spot welding to push out more production.

Write Taylor-Winfield. We have a man near you.



For their new Farm and Food Freezer, Carrier uses Taylor-Winfield Portable Gun Welders.

Carrier Corporation, Syracuse, N. Y., has been using Taylor-Winfield spot welders for many years to fabricate their well-known Carrier Room Air Conditioner.

The TAYLOR-WINFIELD CORPORATION

WARREN . . . OHIO

TAYLOR-WINFIELD RESISTANCE WELDERS

can cause a drooping production curve

**Time-honored Borolon and Electrolon Abrasive Products are now distinguished by the name Simonds.*

SIMONDS ABRASIVE CO. *is a Division of*

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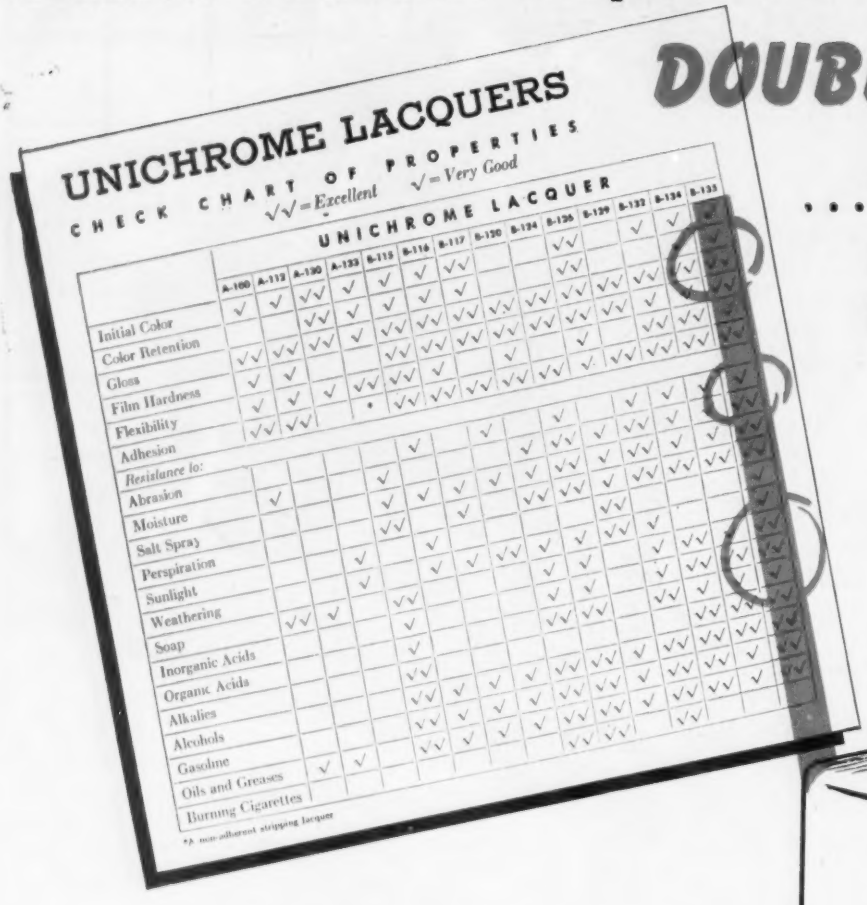

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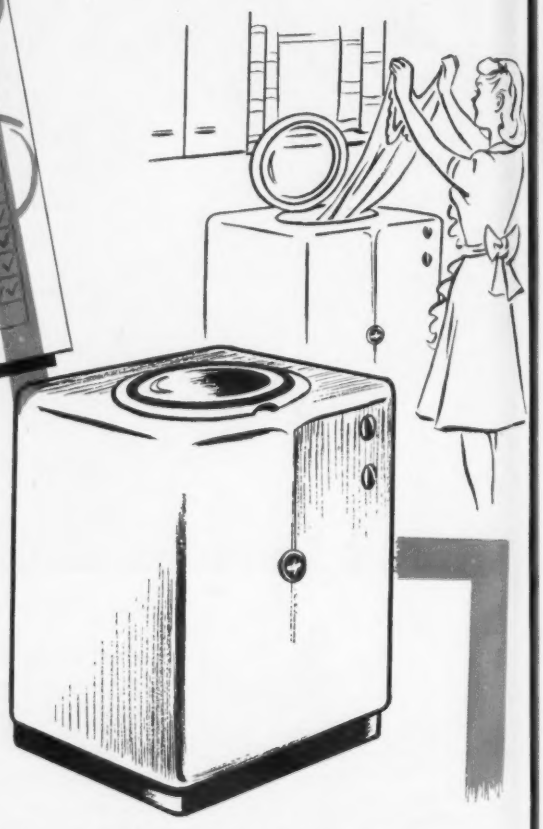

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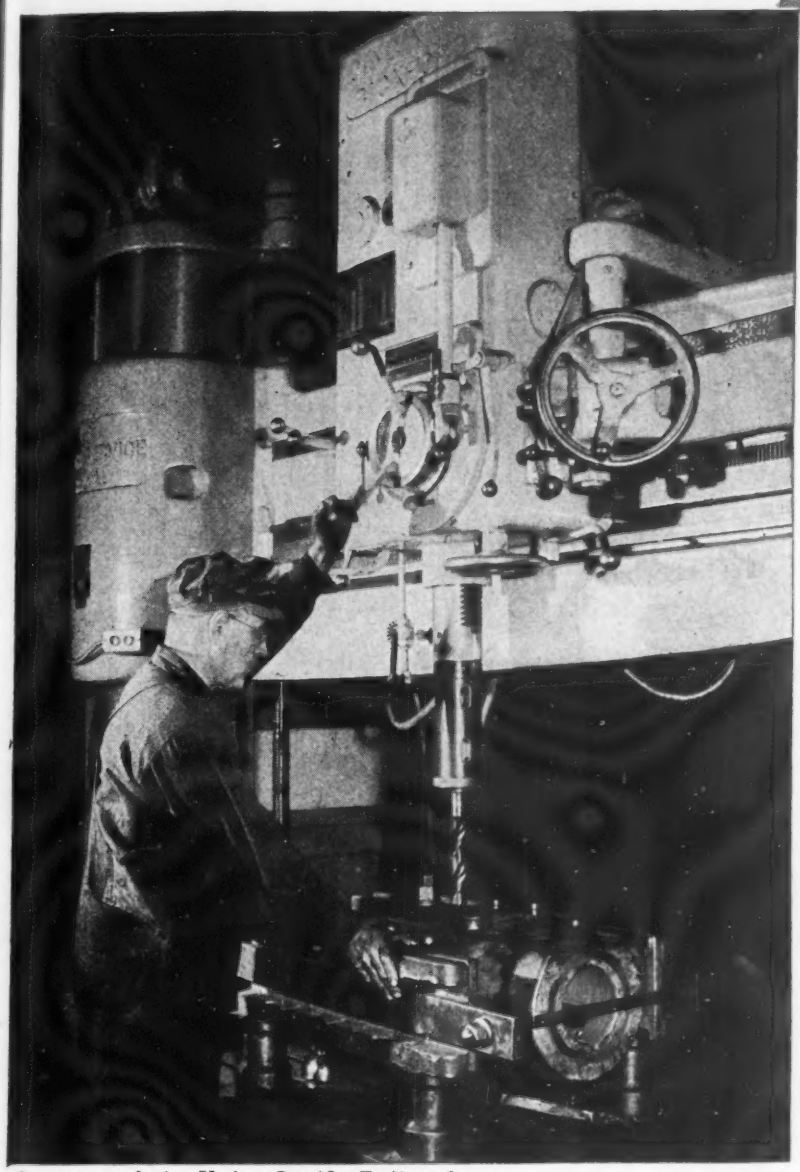
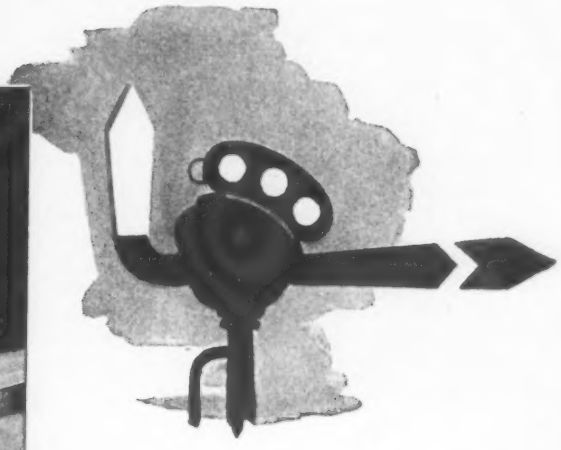


Courtesy of the Union Pacific Railroad



A locomotive crosshead has a job to do, and many miles of perfect performance are a must. Workmanship must be right.

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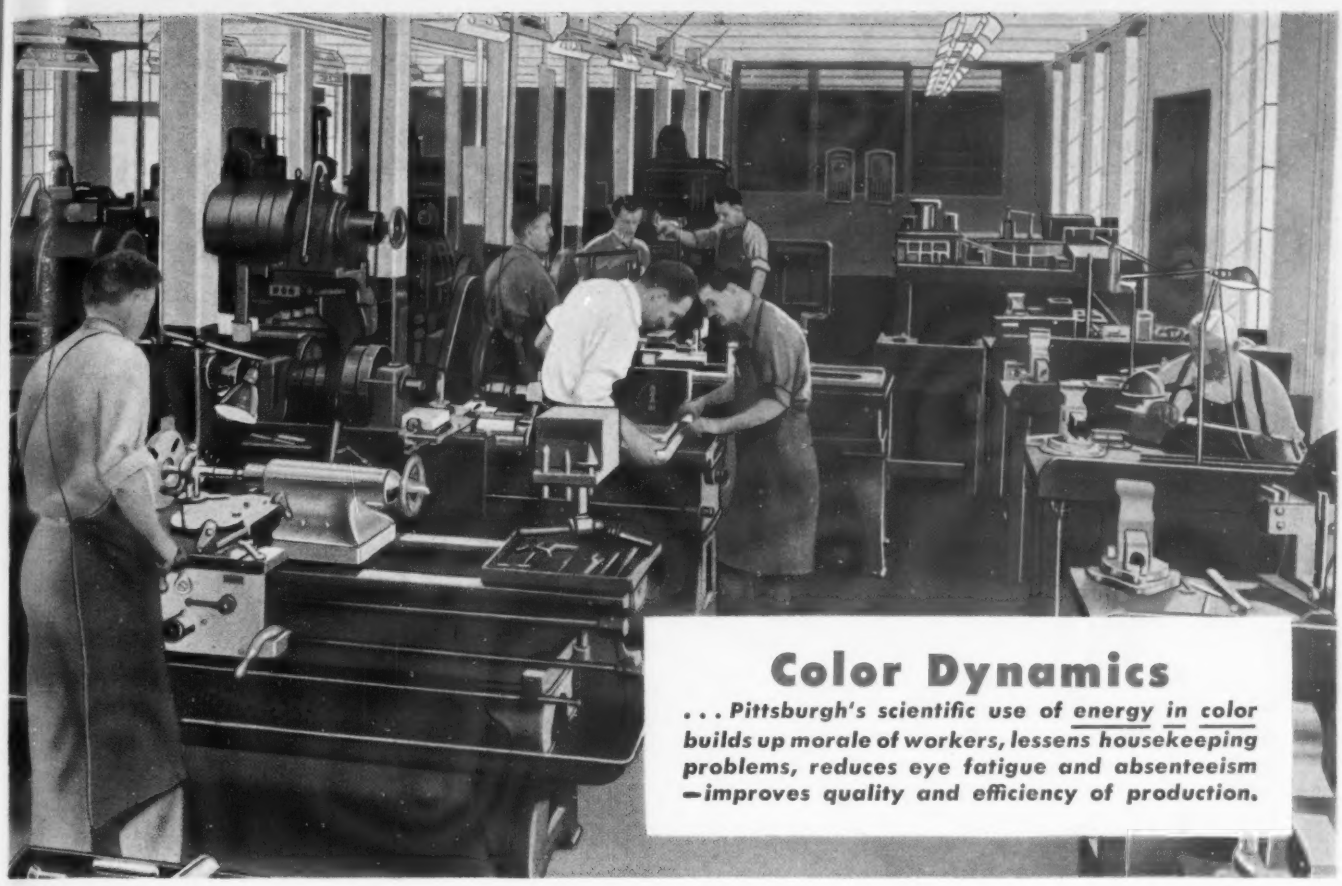
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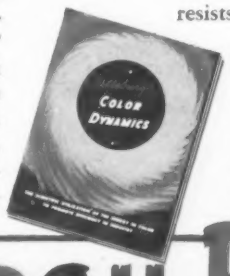
Write for a FREE copy of our booklet, *"Color Dynamics in Industry,"* which fully explains this new method and how to put it to work. Pittsburgh Plate Glass Company, Paint Division, Dept. ST-10, Pittsburgh 22, Pa.



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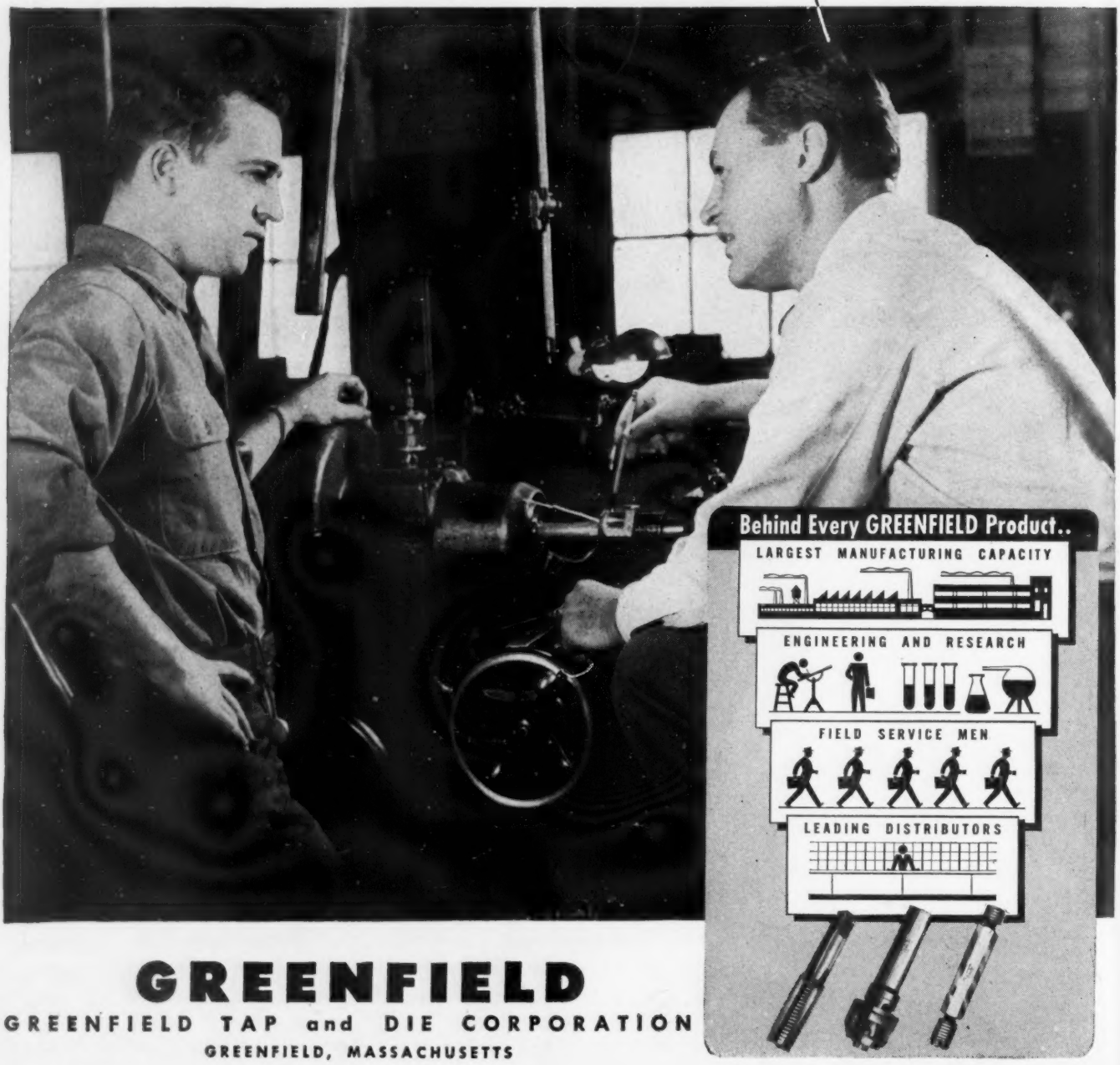

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 119, NO. 16 OCTOBER 14, 1946

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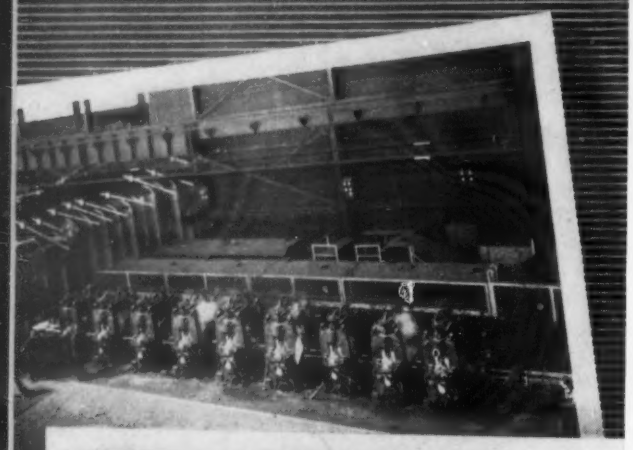
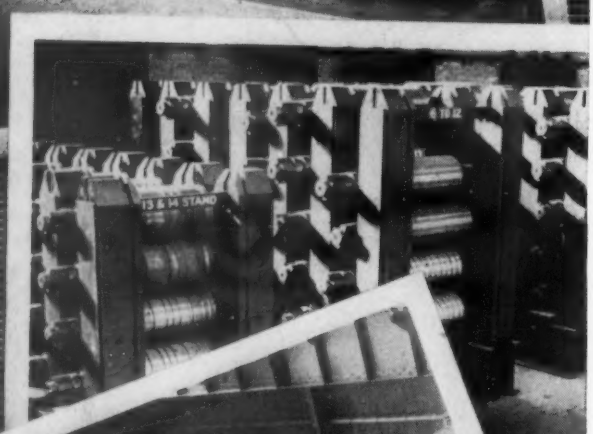
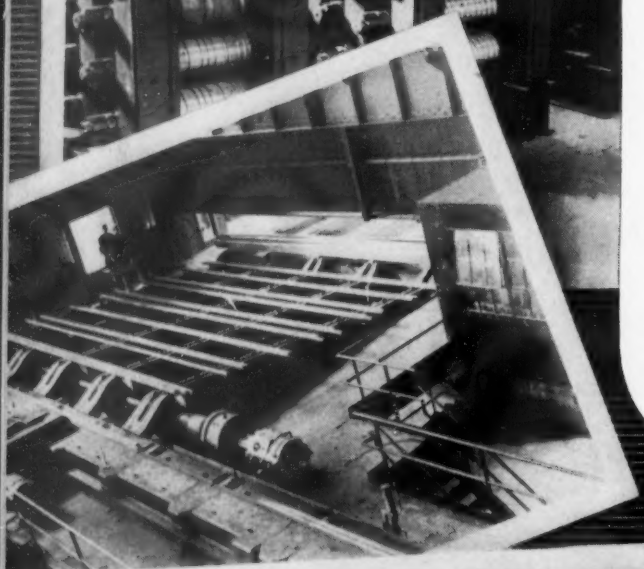






As the EDITOR VIEWS the NEWS

Humpty Dumpty

A pertinent question today is what action Washington will take in the face of what is rapidly becoming a general demand for the abandonment of many government controls.

John O'Leary, vice president of the United Mine Workers, presiding at the union's convention in Atlantic City in the absence of President John L. Lewis, declared that "the people are tired of bureaucracy. They are tired of being told what wage they can earn, what prices they must pay and what food and necessities of life they can buy. The people want a return to a free economy based upon free enterprise and free collective bargaining—the kind of economy that made America great."

At the same meeting William Green, president of the American Federation of Labor, demanded that the government abandon wage controls and abolish the Wage Stabilization Board. He declared Washington holds the national economy in a paralyzing grip and that further continuance of a government-controlled economy will pave the way for totalitarianism.

Last week Eric Johnston, a member of the advisory board to the Office of War Mobilization and Reconversion, declared that wage and price controls are collapsing and urged the administration to abandon wage controls immediately and to decontrol prices, except rents, at the earliest possible moment. "Controls were broken this summer," he said, "and for a time we operated without any controls at all. Now we are attempting the impossible—to put Humpty Dumpty back together again."

This concerted assault upon government regimentation comes at a time when the public is expressing increasing resentment against the confusion that bureaucratic bungling has created. People now are beginning to question the effectiveness of a planned economy in peacetime as critically as industrialists have been questioning it for months. The protests of an aroused general public may succeed in arousing Washington to action whereas to date the most earnest pleas of various industrial groups have failed.

If this happens, then it will be a further sign that this nation belatedly is repudiating the unrealistic program that was sponsored largely by the left wing contingent of the administration in collaboration with the left wing contingent of the labor movement. It was the lunatic fringe element of the New Deal that tried most frantically to perpetuate wartime controls beyond the life of their need in peacetime.

It is worth something to find the people aligning themselves to the right or to the left according to their economic beliefs. In time this alignment will bring constructive results.

STEEL
October 14, 1946

UNCONSCIOUS SABOTAGE: American machine tool builders, who performed near miracles in production during the war, heard well grounded criticism of the government's postwar economic policies at the annual meeting of the National Machine Tool Builders' Association held last week in Quebec.

James Y. Scott deplored the fact that only one quarter of government-owned machine tools had been sold as war surplus up to last July 1, that in spite of expressions of noble interest practically no surplus machine tools have gone to the schools and that a proper reserve of idle machine tools to be held by the armed forces for emergency use has not been provided in adequate volume.

William P. Kirk declared that the United States fell down on the job of meeting the postwar need for high production. "If economic planners had stayed up nights for weeks trying to figure out how thoroughly they could sabotage the American postwar production program," he said, "I don't know how they could have done a more complete job."

These are severe indictments, yet the words of Messrs. Scott and Kirk express accurately the opin-

(OVER)

ion of an overwhelming majority of the individuals who are charged with the responsibility of operating American industry. It seems incredible that Washington can remain so blind to the mess that is so plainly visible to observers on the production lines. —p. 78

• • •

FIRE VS. DEMOLITION: Brig. Gen. William H. Draper Jr., chief of the economic branch of OMGUS in Berlin, makes an interesting observation in regard to the effect of bombing on industrial plants. He points out that although the Army Air Forces obtained photographs indicating hundreds of plants as "totally destroyed," it was found subsequently that about 70 per cent of the machinery in these plants was intact.

There is abundant evidence to corroborate this statement. In a large plant near Cologne the damage to machine tools and equipment was estimated at 30 per cent, although the damage to the buildings was 100 per cent. All but 3 per cent of the equipment damage was repairable. In Krupp plants at Essen heavy machine tools and forging equipment within only a few yards of direct hits by heavy bombs sustained unbelievably minor damage.

Under certain circumstances incendiary bombs can be more injurious to machines than demolition bombs. Machine tools badly warped by heat after incendiary bombing in Japan are more difficult to repair than similar machines exposed to demolition bombing in Germany. —p. 86

• • •

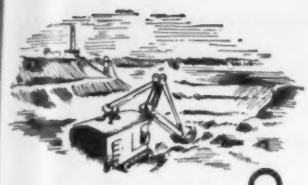
WAR UPON CORROSION: A gratifying development in the metalworking industries is the accelerated progress recorded in recent years in the solution of corrosion problems. Much of this progress can be traced to the realization by engineers some years ago that service conditions are the primary factors in the corrosion resistance of commercial forms of iron and steel. Once this basic premise was established, it became obvious that the procedure for solving a specific corrosion problem is to determine the factors responsible for corrosion and then to neutralize these factors or find a metal, alloy or protective coating that is resistant to them.

Today an increasing number of companies are employing corrosion engineers and a few maintain well organized staffs for corrosion testing. Symposiums sponsored by engineering societies are yielding new comparative data on various methods of metal protection. The present frontal attack upon corrosion should produce noteworthy results. —p. 109

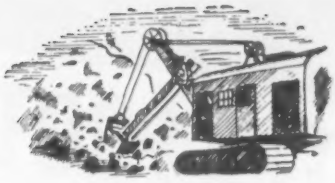
SIGNS OF THE TIMES: Surplus Property Subcommittee of Senate Military Affairs Committee recommends four changes in War Assets Administration's present machine tool dealer setup (p. 89): Eliminate inactive approved dealers in territories where too many have been appointed; correct the inequity in the Clayton pricing formula which gages depreciation by age alone; discourage payment of commissions to dealers who perform no sales service; and assure dealers of prompt payment of commissions by WAA. . . . World passenger car and truck registrations total 42 million (p. 92) with 31½ million in the United States, 2,200,000 in the United Kingdom, 1,500,000 in France, slightly under 1,500,000 in Canada and just over a million (excluding lend-lease vehicles) in Russia. . . . Tennessee Coal, Iron & Railroad's rail mill at Ensley will require four years to clear its order books (p. 95) and Birmingham's cast iron pipe industry has orders for a year ahead, assuming it can continue to operate normally at six days a week. . . . Although under the Potsdam agreement Germany is permitted an annual capacity of 7,500,000 metric tons of steel ingots, current output is running at about 3 million tons a year (p. 84) and there is little hope of increasing this rate substantially until coal output is increased. . . . Because of labor and material shortages which are limiting production, American manufacturers of firearms, fishing tackle, golf clubs and other sporting goods items (p. 87) expect to be able to supply only 75 per cent of the demand in 1947. . . . Barberton, O., plant of Babcock & Wilcox Co. has been using a Sperry supersonic reflectoscope to indicate segregations and inclusions along the edges of plates that are to be welded. Thus far (p. 120) experience with plates 1½ inch or more in thickness has been promising and tests on thinner plates now are under way. . . . Mentors in motordom are pondering the implications of the topsy-turvy situation in which layoffs in automobile plants are increasing (p. 91) in the face of the greatest backlog of demand the industry has ever known. In some quarters there is a belief that manufacturers may utilize the remainder of this year to trim organizations, balance inventories and make other necessary adjustments with a view to getting off to a flying start after Jan. 1, 1947, for a year in which little financial assistance from tax carrybacks can be expected. . . . Planning for mobilizing industry in event of another war (p. 86) is stalled by indecision.

E. L. Shaner

EDITOR-IN-CHIEF



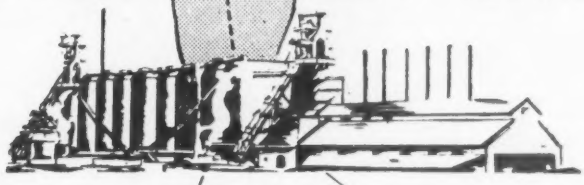
Iron Ore from Hibbing and Ironton, Minnesota



Limestone from Port Inland, Michigan

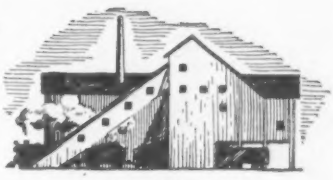
Iron Ore from Iron River and Ishpeming, Michigan

INLAND...all the way!



Plants at Indiana Harbor and Chicago Heights

Fluorspar from Rosiclare, Illinois



Coal from Wheelwright, Kentucky

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As with all fabricating materials, the demand for Inland steel now exceeds the supply. However, we are building new mills and expanding facilities that, we sincerely hope, will improve our steel deliveries in the future and eventually enable us to offer you all of the Inland steel you may require.

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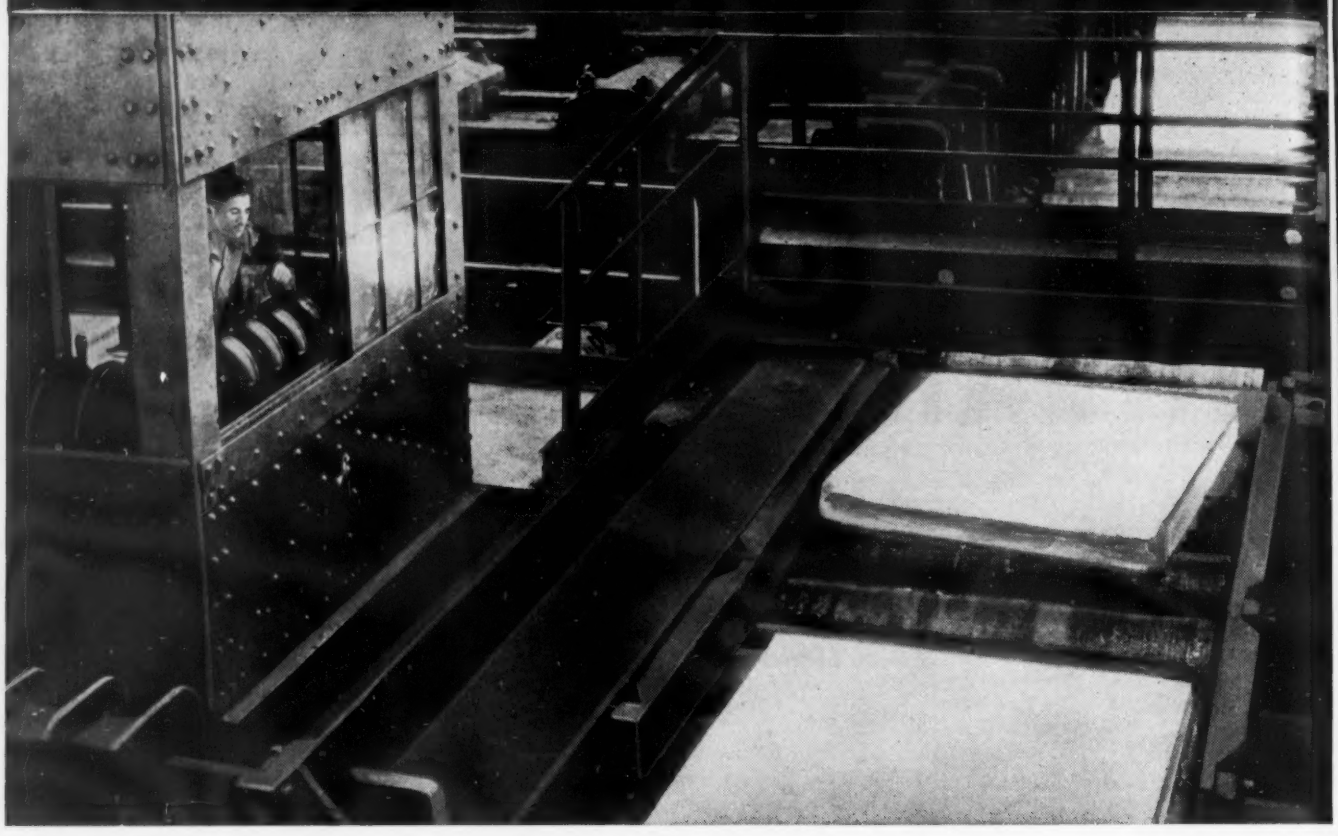

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STEEL
October 14, 1946

Stabilization Program Giving Ground

Truman administration feverishly seeking way out of dilemma as national election approaches. Signs appearing to indicate present wage and price control setup may be scrapped in near future. Meat issue expected to bring showdown on government economic control

STABILIZATION program of the administration, punch drunk and weary from the repeated haymakers of strikes and spiraling wages, materials shortages and soaring prices, is hanging onto the ropes of the economic arena, desperately striving to stand upright as blows of the meat axe variety shake the structure of government economic control to its very foundation.

When will the end come? Last week there were signs that the administration was preparing to scrap the present wage and price control setup instead of just amending it. In fact, there seems to be strong possibility that virtual elimination of the wage and price control programs may come before the national election in November.

The demand for removal of government controls is coming from all directions. Last week a member of the advisory board to the Office of War Mobilization & Reconversion, Eric Johnston, added his voice to the general clamor. He declared that wage and price controls are already collapsing and he called upon the administration to abandon wage controls immediately and to decontrol prices, except rents, "at the earliest possible moment."

Within the OWMR Advisory Board, delegated to the job of devising new government wage-price policy to hold the economy in "balance", a bitter fight is reported. Dr. George W. Taylor, former chairman of the War Labor Board, heads the OWMR Board. Representatives of labor want wage controls dropped at once and are reported sympathetic to Mr. Johnston's suggestion price control be removed. Other board members, however, are understood to favor government policy of trying to hold the wage-price line. Meanwhile, little progress toward working out a new policy has been made, with prospects for success becoming increasingly dim as industrial production falters and meat shortages generate public impatience with unworkable regulations.

In Mr. Johnston's statement, which, incidentally, was considered unusual in light of the fact it broke a tradition that only the chairman publicly discusses matters pending before the board, the former president of the Chamber of Commerce of the United States, and in private life president of the Motion Picture Producers & Distributors of America Inc., said the nation may as well recognize that price and wage controls are collapsing, that the majority of the people are against them, and that no law in the history of a democracy has been effective without public support.

ERIC JOHNSTON

"I had favored controls to assist the country over the tough period of reconversion," he said. "I believe the original sin was committed when we started relaxing controls too early. Too many of us accepted the controls in theory and violated them in practice.

"Controls were broken this summer and for a time we operated without any controls at all. Now we are attempting the impossible—to put Humpty Dumpty back together again.

"The question of controls is now an academic one. The Wage Stabilization Board is dead. It needs only to be buried. Without wage controls it is an illusion to think we can have price control. Attempts at wage controls should be abandoned immediately. They have become a fiction. Prices should be decontrolled at the earliest practical moment because controls are no longer effective.

"Further government effort to control wages and prices, with the exception of rents, can only aggravate an already ugly situation."

Danger from Inflation Would Remain

He said he was not suggesting that removal of the fiction of controls will solve our problems; that with removal of wage and price controls the basic danger of extreme inflation will still remain.

"On the other hand," he declared, "to continue this fiction longer and make lawbreakers out of our people, invites moral bankruptcy. For the future welfare of our country, this latter course is unthinkable.

"Powerful pressure groups, in their struggle for advantage, have frequently lost sight of the national welfare. Our national economy has become a football in this group struggle for power. Deep-seated bitterness and tension among these groups are the worst within my recollection. These major groups must exercise self-restraint and a spirit of cooperation if we are to avoid serious trouble.

"With the realistic abandonment of the fiction of controls, prices and wages will be determined by free collective bargaining and free markets. In a time of short supply as now exists, I recognize the

EDWARD A. O'NEAL

JAMES PATTON

WILLIAM GREEN

GEORGE H. MEAD

T. C. CASHEN

To retain or abolish wage and price controls. This is the question currently being argued by members of the advisory board to the Office of War Mobilization & Reconversion, pictured herewith. Labor members would keep price controls, abolish wage regulations. Some other members favor abolishing both wage and price ceilings and a third group favors continuance of a hold-the-line policy. The board personnel includes: Industry members—Nathaniel Dykes Jr., Federal Deposit Insurance Corp.; Eric Johnston, president of the Motion Picture Producers & Distributors of America Inc; George H. Mead , Mead Corp., Dayton, O.; Labor —Philip Murray, president, Congress of Industrial Organizations; William Green, president, American Federation of Labor; and T. C. Cashen, president, Switchmen's Union; Agriculture—Albert S. Goss, Master of the National Grange; James Patton, head of the Farmers' Union; Edward A. O'Neal, president of the Farm Bureau; public—George W. Taylor and Anna Rosenberg, both of whom have been associated with various government bureaus. NEA photos

GEORGE W. TAYLOR

ALBERT S. GOSS

danger in that direction. But at least it has the virtue of being honest.

"The real test now faces America. The future of our economy depends upon the behavior of pressure groups. If they adopt the national welfare as their yardstick, we can resolve our economic difficulties. The issue is whether we can live as a free people in a free economy."

The administration for some weeks has been sensitive to union criticism of the wage stabilization setup. Now it is alarmed by widespread public discontent with OPA—particularly in the case of meat.

As its deliberations now stand, the OWMR subcommittee appointed to study wage stabilization leans toward recommending winding up the Wage Stabilization Board, instead of just giving it a new formula. As to price control, the OPA has taken preliminary steps in a move which, unless halted, will bring early price decontrol for most of the commodities still covered by price ceilings.

There are many signs to show how White House opinion has shifted but the story is best told by the eighth report of the Reconversion Director Steelman and by the statement of the President that accompanied it. They reveal complete evaporation of the spirit that caused President Truman in June to veto the first OPA extender bill because it was not strong enough, and to sign the second bill in July "with reluctance."

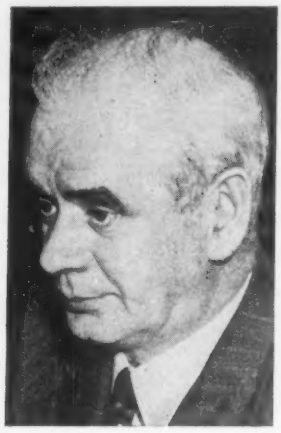
The Steelman and Truman statements emphasize the need for co-operative voluntary action. They stress the thought that the American people want to get rid of wartime controls, and the fact that the government no longer can enforce wage and price controls.

From the Steelman report: "Business as a whole must follow the lead of some of the businessmen who are acting to hold prices down. Labor as a whole must support the labor leaders who are working toward industrial peace and not pushing for uneconomic wage increases. The farmers must maintain their high level of production for an abundant supply of food at reasonable prices. Each consumer has the responsibility to see that his money is spent wisely. Public resistance to higher prices . . . can be a tremendously effective weapon to keep prices in line."

From the Truman statement: "I hope every businessman, worker, farmer and consumer will take to heart this sentence from Mr. Steelman's report: 'An all-out emphasis on production of finished goods and on preventing a further increase in prices is the task immediately before us.' "

In addition to the election there is another factor which should bring early clarification of the administration's al-

ANNA ROSENBERG



PHILIP MURRAY

NATHANIEL DYKE JR.

tered philosophy in regard to wage stabilization. The big unions are beginning to shape up their demands for the next contract year, and some of the most important will hold meetings in November. So it is likely that before that time the White House will make it clear that it is retiring from the business of settling strikes and that it will leave these matters to labor and management.

Meanwhile price control continues to waver with upward adjustments and decontrol actions a matter of almost daily occurrence. However, the bureaucrats are playing their string out to the bitter end, contesting every major industry's effort to attain free markets. A check at OPA last week revealed there is not a single instance where price relief has yet been granted under the Barkley amendment to the price control law. Numerous industry advisory committees have discussed the advisability of applying for higher prices under the amendment but have given up on learning of the effort and time required. Not a single petition for relief under the formula has yet been filed.

Effect of Removal Considered

Most observers are of the opinion that removal of government controls would be followed by a sharp, temporary rise in prices which would be resisted by buyers. Gradually the prices would level off as production caught up with market demands and the law of supply and demand came into operation. Opponents of this theory, however, claim that lifting of controls resulting in an immediate surge in prices would only bring on a second wave of wage demands which would throw the economy for another loss. That this viewpoint has merit is accepted without question. However, it is pointed out that currently some union leaders have been displaying more restraint than usual on the wage question and the view has been advanced that influential labor men are coming around to the high production-low cost philosophy which has been advocated by industry as a means of increasing real wages.

The whole question of decontrol at the moment appears to be hinging on the disposition of the dispute concerning meat. Last week the beef industry advisory committee voted 11 to 1 to petition the secretary of agriculture to decontrol all cattle, calves and beef. It generally is agreed if any government control policy charge is effected before election day, it will begin with meat. Developments in this industry may provide the clue to general government control policy for future.

Industry Members Quit Wage Stabilization Board

The industry members of the Wage Stabilization Board, A. Coleman Barrett and Earl N. Cannon, last week resigned from the Wage Stabilization Board. In a letter to Mr. Truman they pointed out that since Reconversion Director Steelman overrode the board's decision in the maritime strike three weeks ago, they do not believe wage controls are feasible and suggested that the President lift all wage controls.

Industry-Wide Pay Base Policy Developed by WSB

Wage Stabilization Board last week announced broadening of its policy on approving wage increases designed to bring a company's pay scales into line with those of other plants in the same industry. The new policy of correcting wage inequities allows consideration of the "general picture of related wage movements" before June 30. This means that increases granted by other firms may be considered, for comparative purposes, even though these increases were not approved by the board as grounds for price increases.

Steel Producers Increase Light Product Output

Shipments in first six months of year represent 45.4 per cent of total movement, highest reported since 1939

INCREASED emphasis on production of the lighter steel products, used chiefly in the manufacture of consumer goods, is reported by the American Iron & Steel Institute. In the first six months of this year of the total tonnage of steel products shipped into consumption the proportion of so-called light products was higher than in any first-half year since 1939.

During May of this year, according to the institute, shipments of the light products actually exceeded shipments of heavy products by a small margin, for the first time on record.

The total of steel products shipped in the first six months of 1946 was approximately 22 million tons. Of that steel, 9,986,000 tons or 45.4 per cent, consisted of the light products, which are sheet and strip steel, tin and terne plate, wire and wire products, black plate, conduit and light tubing.

From October, 1941, to October, 1945, light products accounted for less than 40 per cent of total shipments. For the year 1943 the percentage of light products dropped to only 29.1 from 46.3 in 1938. The average for the first half of 1939 was 45.7 per cent.

More Light Steel Shipped in May

During May of this year the amount of light steel shipped was 1,953,067 tons, compared with 1,952,997 tons of heavy products. Thus, shipments of light products exceeded shipments of heavy products by 70 tons.

The total tonnage of steel products shipped in the first six months this year was nearly 12 million tons below shipments in the corresponding part of 1945. This sharp decline was caused principally by the one-month steel strike, the prolonged strike of coal miners and the steel industry's difficulty in obtaining ample supplies of scrap and coke.

Despite loss of 15 to 20 million tons of steel production occasioned by the strikes and other hindrances in the first half of this year, total output of steel in 1946 may establish a new peacetime record if further production handicaps are averted

(*Please turn to Page* 196)

Government-Owned Surplus Tool Disposal to Date Disappointing

Speaker at annual convention of National Machine Tool Builders' Association says only one-fourth of surplus sold up to July 1. Practically no machines placed in the schools. H. H. Pease elected new president of association

H. H. PEASE

ONLY a little over one-fourth of government-owned machine tools had been sold as war surplus up to July 1 of this year, James Y. Scott, president, Van Norman Co., Springfield, Mass., and chairman, Government Relations Committee of the National Machine Tool Builders' Association, declared last week addressing the annual meeting of the association at Chateau Frontenac, Quebec.

The convention, which was the association's 45th annual meeting, was attended by over 500 delegates, and was featured by presentation of papers covering various phases of the machine tool industry's problems.

Newly elected president of the association is H. H. Pease, New Britain-Gridley Machine Division, the New Britain Machine Co., New Britain, Conn. He succeeds William P. Kirk, Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn.

Other newly elected officers are: 1st vice president, Alexander G. Bryant, Cleereman Machine Tool Co., Chicago; 2nd vice president, L. D. McDonald, the Warner & Swasey Co., Cleveland; treasurer, Louis Polk, the Sheffield Corp., Dayton, O. Tell Berna was re-elected general manager, and Frida F. Selbert, secretary. Mr. McDonald, Mr. Polk, and H. L. Tigges, Baker Bros., Inc., were named directors.

In his address Mr. Scott pointed out machine tools to the original value of $954,537,000 have been declared surplus, and this, it is thought, is over 90 per cent of the eventual total. Of these, he said, tools to the original value of $257 million have been sold.

"We feel that this enormous supply of machine tools, mostly of recent manufacture, should be put to work in the metalworking plants of the United States as quickly as possible to replace some half-million obsolete machines still in use," he said.

"The results so far are very disappointing. Red tape, confusion and delay have been characteristic of the operation.

"In spite of all our effort, in spite of directives, in spite of statements of policy, practically no machines have gone to the schools. Never have so many expressions of noble interest been so barren of results. First, they were to have a 40 per cent discount. Then they were to be allowed to take machines that could not be sold commercially, and which would otherwise be scrapped. Now the thinking is to charge a school 6 per cent of the original price. Why 6 per cent? Because that is supposed to cover handling costs. The schools who most need the machines can't pay 6 per cent. The attorney general has ruled that the War Assets Administration can legally give surplus to non-profit educational institutions under the Surplus Disposal Act as amended, but the machine tools are not going to the schools.

"We have long urged a proper reserve of idle machine tools to be held by the armed forces. Unfortunately, the last session of Congress passed a law prohibiting the transfer of property from one branch of the government to another without payment. The armed services want these reserves, but only one or two departments acted quickly enough to secure any before the passage of that act. The entire reserve of all the armed services, not including machines installed in arsenals and yards, is probably less than one month's output of the industry at wartime peak."

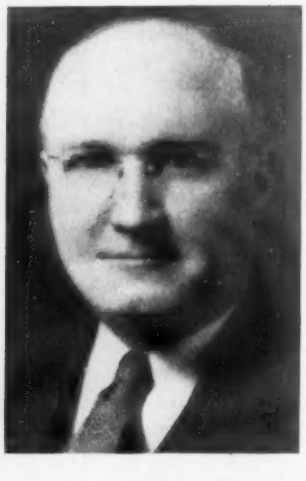
Referring to the intent of the War Assets Administration to scrap certain machine tools declared "commercially unsalable", Mr. Scott said:

"In the face of a decidedly uncertain international situation, we are destroying part of our war potential that just does not exist in our shops in times of peace, that cannot be hastily improvised or commandeered. You know better than anyone how desperately hard it is get such machines fast enough in time of war. They should be reserved by the armed services and the best of them stored."

After V-J Day, when everybody said the need was for production and still

H. L. TIGGES

ALEXANDER G. BRYANT



L. D. McDONALD

LOUIS POLK

more production, the United States fell down on the job, it was charged by William P. Kirk, president of the association and vice president, Pratt & Whitney Division, Niles-Bement-Pond Co., in his address to the convention.

"The fact is," Mr. Kirk said, "that although we talked productivity, what we really did was to put every obstacle we could think of in the path of production accomplishment.

"Through renegotiation and excess profits taxes, industry was deprived of reserves which they needed for financing reconversion, redesign and expansion for peacetime products.

"In the case of hundreds of items, price control regulations stopped production cold.

"Strikes and slowdowns knocked an incredible volume out of our production totals.

"And finally, the supply of basic materials was messed up still worse by adding the red tape of government control to an already hopelessly muddled picture.

"If economic planners had stayed up nights for weeks trying to figure out how thoroughly they could sabotage the American postwar production program, I don't know how they could have done a more complete job."

Most of the blame, Mr. Kirk asserted, belongs on the doorstep of government and leaders of organized labor. Government, he said, has followed a policy of appeasement, and union leaders have deliberately fostered, in many cases, schedules of limited productivity.

"Until we can get a fair measure of productivity," Mr. Kirk declared, "prices will continue to go up in proportion to wages or even more; and the inflation cycle will continue; the scarcities and the black markets will be universal; and we will wind up in a national economic collapse. Steadily increasing productivity is the one sure road toward low prices, high wages, steady employment and an increase in standard of living."

E. Barker, president, Canadian Machine Tool Association, spoke on wages and on reciprocity between the United States and Canada.

M. Gratton O'Leary, associate editor, the *Ottawa Journal*, told the meeting a moral revival throughout all North America is the only assurance against continuing world chaos.

A. B. Einig, president, American Machine Tool Distributors' Association and general manager, Motch & Merryweather Machinery Co., Cleveland, in his address on "A Look at the Orient," pointed out that the lack of abrasive wheels was a contributing factor for Japan's industrial breakdown. Mr. Einig was a member of the Pauley Reparations Mission which recently completed a tour of the Far East and Europe.

Other speakers on the convention program included: Nelson F. Caldwell, export manager, the Cincinnati Milling Machine Co., Cincinnati, who spoke on "Europe Rebuilds"; Alexander S. Keller, chairman, Committee on Foreign Sales, and vice president, Pratt & Whitney, whose subject was "What Can We Hope To Sell Abroad?"; Phil Huber, president, Ex-Cell-O Corp., Detroit, speaking on "Price Control—The Last Lap"; and reports by Mr. Berna as general manager, Mr. Richard E. LeBlond, president, the R. K. LeBlond Machine Tool Co., as treasurer of the association, and Louis Polk on public relations.

Meetings of 4 Societies Planned at Metal Congress

Seventy-nine simultaneous sessions of four technical societies will be held during the 28th annual National Metal Congress and Exposition at Atlantic City, N. J., Nov. 18-22. Participating technical societies are: American Society for Metals, sponsor; American Welding Society; Iron and Steel Division and Institute of Metals Division, American Institute of Mining and Metallurgical Engineers; and the American Industrial Radium and X-Ray Society.

Speaker at the ASM annual banquet Nov. 21 will be Walter S. Tower, president, American Iron and Steel Institute.

ASTE Convention Called Off Because of Strikes

Cancellation of the semiannual convention of the American Society of Tool Engineers which was to have been held in Pittsburgh Oct. 10-12 was caused by power, hotel and other strikes in the Pittsburgh area, Harry E. Conrad, executive secretary of the society, has announced.

Tentative plans have been made for the society's board of directors to meet in Detroit Oct. 26-27 and for the editorial, educational, judicial and membership committees to meet on Oct. 25.

Present, Past and Pending

■ STEEL OUTPUT SINCE 1937 TOTALS HUGE TONNAGE

NEW YORK—Nearly 1,910,000,000 net tons of steel ingots and steel for castings were produced in the United States from January, 1901, through August, 1946, American Iron & Steel Institute reported last week. Almost one-third of that tonnage was produced after Jan. 1, 1938.

■ EIGHT MARITIME YARDS OFFERED FOR SHIP-BREAKING

WASHINGTON—Government offered last week eight more Maritime shipyards for lease for ship-breaking operations to augment supplies of scrap.

■ KAISER-FRAZER AND FIAT NEGOTIATING AGREEMENT

DETROIT—Kaiser-Frazer Corp. is negotiating with Fiat Co. of Italy to produce jointly a new lightweight car for the American market. Chassis would be made in Italy.

■ ORDERS FOR GRAY IRON CASTINGS EXCEED SHIPMENTS

WASHINGTON—New orders for gray iron castings continued in August to exceed shipments, although the latter rose 16 per cent to 944,516 tons. Unfilled orders for sale to the trade rose to 2,785,609 tons.

■ SHIPMENTS OF STEEL CASTINGS, FORGINGS INCREASE

WASHINGTON—Shipments of steel castings increased in August to 130,450 tons, malleable castings to 68,603 tons and steel forgings to 170,692 tons. Order backlogs increased to 374,731 tons, 272,440 tons, and 639,398 tons, respectively.

■ PORTSMOUTH STEEL TO DISPOSE OF BARREL PLANT

PORTSMOUTH, O.—Portsmouth Steel Corp. is negotiating for lease or sale of its barrel shop due to lack of sheet steel. Wheeling Steel Corp., present operator, expects to fill accumulated orders by Oct. 19.

■ SHORTAGE OF ENGINEERS TO REACH PEAK IN 1949

PRINCETON, N. J.—Shortage of 8000 engineers to meet current demands in the United States was reported last week by Dr. Karl T. Compton, president, Massachusetts Institute of Technology. It is estimated that this shortage will reach its peak of nearly 40,000 in 1949.

■ RFC TO GUARANTEE MARKET FOR 10,000 STEEL HOUSES

WASHINGTON—NHA has issued a directive calling for negotiation of a guaranteed market contract between RFC and William H. Harmon Corp., Philadelphia, for delivery by the end of 1947 of 10,000 factory-built steel houses. Prices will range from $2925 to $3672, fob factory, depending on size.

Effective Two-Way Foreign Trade Requires Sound Rules, Says Reed

General Electric chairman praises action taken by Office of International Trade in promoting system that will encourage movement of foreign commerce at 280th meeting of National Industrial Conference Board in New York

THE LEAD which the United States government is taking in promoting the development and acceptance of rules for international trade was strongly endorsed by Philip D. Reed, speaking at the 280th general meeting of the National Industrial Conference Board in New York.

Mr. Reed, who is chairman of the board, General Electric Co., Schenectady, N. Y., and chairman, United States Associates, International Chamber of Commerce Inc., held that sound rules and principles are necessary to an effective two-way foreign trade under private enterprise and said he believes the State Department is exerting a constructive influence toward that end.

He addressed a forum on "Foreign Trade Under Global Planning" at the Waldorf-Astoria Sept. 26. Other speakers were Clair Wilcox, director, Office of International Trade Policy, Department of State, and O. Glenn Saxon, professor of economics, Yale University, New Haven, Conn. Neal Dow Becker, president, Intertype Corp., New York, vice chairman of the Conference Board, presided, and Dr. Virgil Jordan, president of the Conference Board, was an unscheduled speaker.

Obstacles to World Trade Cited

Mr. Reed declared that tariffs constitute only one of the obstacles to effective world trade. "Monetary restrictions, exchange controls, import and export licenses and quotas, endless formalities and red tape encumbering the movement of products and people are just as serious and in some respects more so than tariffs."

The speaker advocated a two-way foreign trade and pointed out that during the past 25 years America hasn't received payment for a substantial part of her exports. During the 1920s hundreds of millions of dollars were lent abroad. These credits, he explained, were used to pay for American products exported during that period. But when the loans came due a great many of them defaulted because, American imports having been substantially less than exports, dollars were not available abroad to meet these obligations.

During the 1930s, Mr. Reed continued, "we sent dollars to foreign countries in exchange for their gold which we put into the ground and did not use to buy foreign products. In this way we continued to supply our foreign customers with dollars to pay for our exports without receiving imports in exchange and so impoverished ourselves, except as gold in the ground may be regarded as contributing to our standard of living."

He then mentioned the huge quantities of goods exported during World War II under lend-lease. This was a wartime experience which was exceptional and justified, he said. "However, we cannot continue indefinitely to be a sort of involuntary Santa Claus by shipping goods out of this country and in effect refusing to accept payment for them."

He declared that the United States must get over the notion imports lower standard of living.

Mr. Wilcox asserted this country's international trade policy is based on four fundamental principles. "First, we believe that the volume of international trade should be large—larger, certainly, than it was between the wars; second, that international purchases and sales should be made, at our end of the transaction at least, by private enterprise; third, that trade should be multilateral rather than bilateral; and fourth, that it should be nondiscriminatory."

Government cartelization of basic commodities in foreign trade was described as a "Fascist device" which would throttle enterprise and stifle all competition by Professor Saxon, who warned that "a full fledged war will be only a matter of time" should government cartels be set up by the leading powers and commercial warfare started.

CPA Needs Steel Men To Spur Production Program

Civilian Production Administrator Small last week asked the steel industry to bolster the Washington CPA staff with technical consultants from the industry during the next two months. Speaking to the steel product advisory committee meeting he explained technical men are needed by CPA to assist on freight car programs, production and distribution problems on pig iron, steel sheet, iron and steel scrap and coke.

Informal comment at CPA points to restoration of allocation of steel by Jan. 1. Priority programs will require 1,395,000 tons of steel products in the fourth quarter. Informal assistance by CPA will be granted to freight car building and restocking of steel warehouses to an extent that leads informed observers to anticipate that establishment of allocations of steel will again become necessary not later than the first of the year.

Magnesium Production Currently Running Ten Times Prewar Volume; Further Increase Seen

MAGNESIUM production this year will be more than ten times the prewar volume, Dr. J. D. Hanawalt, general manager, Magnesium Division, Dow Chemical Co., Midland, Mich., told the third annual convention of the Magnesium Association at the Waldorf-Astoria, New York, Oct. 3-4. Dr. Hanawalt anticipated still further expansion and predicted the magnesium industry "can expect to enjoy relatively decreasing costs and increasing popularity."

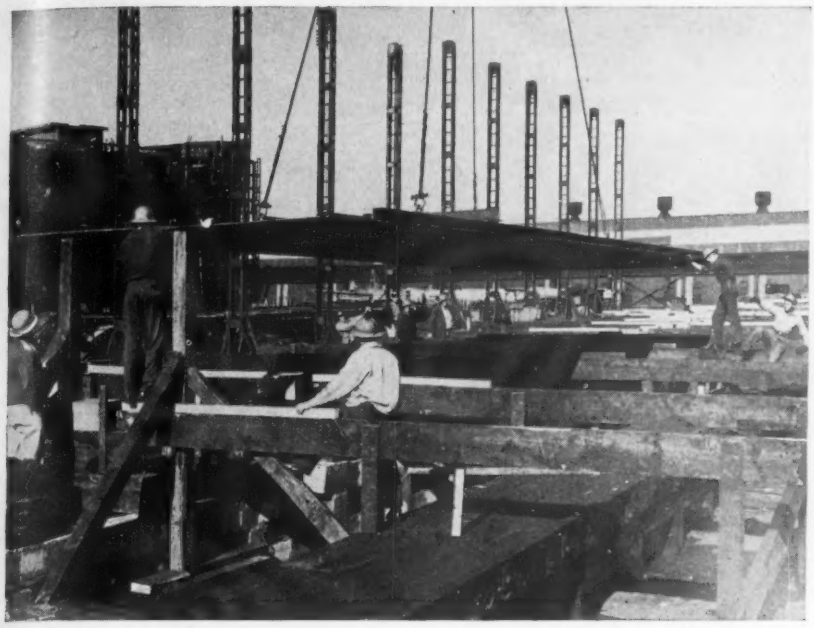
T. W. Atkins, executive vice president of the association, estimated magnesium consumption will reach 100,000 tons annually by the end of 1947.

In addition to problems relating directly to the industry, certain of the broader economic aspects affecting the country as a whole came in for discussion. C. Donald Dallas, president, Revere Copper & Brass Inc., New York, highlighted disconcerting trends, which, he said, was the duty of industrial leadership to combat.

He pointed out that enterprise in this country, far from being free, "is rapidly being brought to a standstill" by governmental restrictions and dislocations of one description or another.

"Wages have been increased radically without any increase in production and have arbitrarily raised costs to a point where a large part of our purchasing public will be compelled to withdraw from the market," he declared. "It will soon be found that labor can price itself out of the market. Price control and other government regulations, however necessary some of them may be conceived to be, are strangling production and are developing black markets on an enormous scale.

"Let industrial leadership say now that



PRIVATE SHIPBUILDING RESUMED: First postwar ship for a private owner is started at United States Steel Corp.'s Federal shipyard at Kearny, N. J., as the keel section is laid for the first of two gypsum rock carriers for Panama Gypsum Co. Inc. Ships are scheduled for delivery next spring. Each will have a deadweight of 10,350 tons and a total capacity in the holds of 300,000 cubic feet

these causes will quickly bring about depression and unemployment. Let industry do what it can to correct public opinion so that it will not be blamed for the effects."

Industry problems covered at the meeting included development of standards, forging and casting problems and new applications for the light metal.

Newly elected officers are: President, R. D. Taylor, assistant manager, Eastern Operations, Federated Metals Division, American Smelting & Refining Co., New York; vice president, J. D. Barrington, vice president and general manager, Dominion Magnesium Ltd., Toronto, Canada; treasurer, Irving T. Bennett, vice president, Revere Copper & Brass Inc., Baltimore.

T. W. Atkins remains as executive vice president and secretary.

Fabricated Reinforcing Concrete Bar Prices Rise

Producers' ceiling prices for fabricated concrete reinforcing bars have been raised about $2.50 per ton while certain steel castings have been suspended from price control, Office of Price Administration has announced.

The increases, effective Oct. 9, in reinforcing bars were effected by raising extras for bending 15 cents per 100 pounds and for engineering 10 cents per 100 pounds. In addition, fabricators may now charge published trucking rates when delivery is made entirely by truck. Sellers of concrete reinforcing bars may pass on increases in maximum arbitrary delivered prices being granted their suppliers at the same time.

Steel castings covered by the general steel castings and railroad specialties regulation, price schedule No. 41, have been exempted from price control, effective Oct. 4. OPA said that the supply is ample to meet demand and that purchasers of all classes of steel castings in all sections of the country are obtaining full requirements.

Hargrove Named President Of AGA at Annual Meeting

Marked strides in development of industrial heating equipment were revealed at the 28th annual convention and exhibition of American Gas Association at Municipal Auditorium, Atlantic City, N. J. Advancement in this and other lines of gas equipment and appliances were reported at technical sessions.

Reginald H. Hargrove, vice president and general manager, United Gas Line Co., Shreveport, La., was elected president of the association, succeeding Everett J. Boothby, vice president and general manager, Washington Gas Light Co., Washington.

Pittsburgh Power Strike Cripples Metals Plants

Steel mills, supplying own power, continue at high level. Ford open hearths closed by cranemen's walkout

METALWORKING operations in the Pittsburgh district continued at a low level last week due to the power strike. Most electric furnaces were down, although open hearths and steel finishing mills were operating at practical capacity.

Steel mill managers say there is little prospect of bringing electric furnaces back into operation so long as the power strike continues.

Many metalworking plants have been closed since the start of the strike Sept. 24. Their closing has affected industrial operations in other communities due to cessation of shipments of the components they manufacture.

Foundry operations have been cut sharply; this in turn has affected the operations of companies depending on castings. Some coal mines have been hard hit by the power interruption.

Interstate Commerce Commission has reduced the 4-day demurrage rate from $16 to $5.50 as a result of inability to unload cars due to the power strike.

A number of Pittsburgh's stores and other business places reopened last week with power supplied by private generating units. However, an estimated 90,000 still were unemployed as direct result of the strike.

At Warren and Niles, O., operations at three steel mills, Republic Steel Corp., Copperweld Steel Co. and Thomas Steel Co., were affected by a strike of CIO utility workers against the Ohio Public Service Co. Settlement of the stoppage was being negotiated at week's end.

At Detroit, Ford Motor Co. open-hearth operations were suspended as result of a walkout by cranemen who left their jobs Oct. 3. The walkout forced supervisory help to tap furnaces still in operation, but not before 100 tons of steel were spilled and lost. Production loss amounts to 13,000 tons of ingots weekly.

Steel shortages are forcing sharp curtailment of automotive manufacturing operations in the Detroit area, Ford, Hudson, and General Motors being among those affected.

12,500 Machine Tools Will Be Stored by AMC

Industrial reserve to be set aside in preparation for future emergency. Tools now being selected

PLANS for storing an industrial reserve of 12,500 machine tools against a possible future mobilization emergency are being formulated by the Air Materiel Command Headquarters, Wright Field, O.

The tool reserve is intended to reduce the production load on the machine tool industry during the critical months of any future emergency industrial mobilization and would contribute to the immediate expansion of military aircraft production should such expansion become necessary.

A study initiated at Wright Field in 1944 determined how many of each type of tools would be required to reach a certain production rate within a given period. The present problem revolves around the selection of the general purpose tools. Skilled AMC personnel are now examining tools located throughout the country in government-owned aircraft plants, military depots and War Assets Corp. warehouses.

After selection, the tools will be shipped to strategically located storage places where they will be prepared for extended storage.

Just before the second world war ended, the United States had about 1,700,000 machine tools, including about 600,000 owned by the government. Experience during the war demonstrated that the immediate demands of the AAF for machine tools were greater than the peacetime industry could provide.

Present estimates are that the demands of the AAF in the first year of any future emergency would total around $300 million, which contrasts with the industry total of $195 million produced in prewar 1937. By 1942 the machine tool industry had expanded its production to a billion and one-third dollars.

AUTO ENGINES SUPPLY POWER: This new dynamometer room is one of the show places of the Dodge main plant in Detroit. Engines on test generate 510 kilowatts of electric power an hour, helping to run the plant without coal

Cleveland Automatic and LeBlond Engineering Merge

Stockholders of the Cleveland Automatic Machine Co., Cleveland, have authorized a merger of the LeBlond Engineering Co., Cincinnati, into their company. The business of both will be continued under the name of Cleveland Automatic Machine Co. The Cincinnati plant will operate as a division of Cleveland Automatic.

LeBlond Engineering was organized in 1940 and was wholly owned by the R. K. LeBlond Machine Tool Co. The merger into Cleveland Automatic gives the LeBlond interest 84 per cent stock ownership in Cleveland Automatic.

Educational Presentation Offered on Machine Tools

L. A. Wilkie, chairman, DoAll Co., Des Plaines, Ill., is offering an educational presentation to acquaint industrial managers and workers, school instructors and students, professional people and the general public in the whys and wherefores of today's machine age. The presentation includes a large wall chart in color showing an arch of progress of which the keystone represents the place of the machine tool as the basis of mass production. Another item is a 60-page booklet entitled "Your Life in the Machine World."

New Tool Orders Up as Surplus Offerings Drop

St. Louis—Moderate upsurge in orders for new machine tools is developing here with the continuing decline in surplus tools. Fair volume of the latter is still reaching the market but the confusion over the veterans' priority system is discouraging non-veteran buyers. The orders represent a considerable number of new enterprises as well as ambitious expansion programs by established ones. For example, a large producer of carburetors is planning to double its capacity. The effect is that deliveries generally, though good in spots, are worse than during the war. Punch presses are not promised under 27 months; other types 8 to 18 months; knee type milling machines 4 to 8 weeks, and bed types 8 to 12 months. Order cancellations are rare even in the face of one to two year deliveries.

Surplus Tool Buyers' Service Needs Large

New York—Requests for servicing surplus machine tools are more frequent than new orders; used machines often need adjustment; parts or fixtures and help are generally asked of the builder.

New volume with some shops was slightly better last month compared with the two previous, but surplus sales are unquestionably affecting orders for new units, notably general purpose types.

Reconversion and expansions for the near future have been about completed by most industries and some expansion programs have been delayed or postponed. Material shortages are a factor, but production of fractional horsepower motors is mounting and improvements in deliveries may be expected by some producers early next year.

Outlook for New England Pig Iron Supply Dark; Many Foundries Down

PROSPECTS are not promising for early relief from the critical pig iron shortage being experienced by New England consumers despite emergency efforts of the Civilian Production Administration and the Office of Price Administration to step up the movement of iron to the area. More than a score of foundries in the district already have closed and an increasing number of them are confronted by stoppages over the remainder of the year unless pig iron supply conditions improve. It is understood CPA does not plan to increase allocations to the area.

Efforts of the government agencies to correct the situation appear to be stymied by lack of co-ordinated action obstacle to solving the problem rests in the unfavorable price situation with OPA declining to depart to any material degree from its price schedule in the area.

The situation is this. Pig iron producers outside the New England area contend the Everett, Mass., basing point should be eliminated since no iron currently is being produced at that point, the blast furnace there being idle. So long as this basing point is recognized by OPA in its price schedule producers of iron outside New England must absorb a large part of the freight from their furnaces to New England.

Producers at Buffalo, for instance, have a base price at Buffalo of $28.50 per gross ton and to ship iron to Boston can charge only $30.06, the same delivery price as is charged on iron produced at Everett, Mass., where the base price is $29.50. To meet this Everett price, outside producers must absorb about $4.63 in freight.

Amendment Being Considered

The Office of Price Administration has declined to remove Everett as a basing point. However, it is considering an amendment to price schedule No. 10 which would provide a New England delivered price sufficiently high to cover costs, and guarantee them against losses. Issuance of the order is reported to have been delayed due to opposition by some CPA officials as well as pig iron producers who view such a proposal as virtually eliminating profit on sales.

Civilian Production Administration is expected to take such action as is necessary to maintain pig iron shipments to New England through October at the same levels that prevailed in recent months. This action likely will be in the form of directives, requiring producers to deliver specified tonnages to consumers in that area. The directives would apply chiefly to shipments from Buffalo and eastern Pennsylvania.

At the same time, CPA is attempting to secure the earliest possible operation of the Mystic blast furnace at Everett, Mass., which has been down two years. This plant will resume production by Dec. 1 under the recently announced subsidy program which gives this producer a $12 a ton premium as an idle stack returning to blast.

Scrap Shortage Seen So Long as OPA Rules Remain

Despite government efforts to stimulate collections and shipments the serious shortage of scrap continues and unless relieved soon threatens to force curtailment in steelmaking operations, currently at 90 per cent of capacity.

Last week, E. C. Barringer, president, Institute of Scrap Iron & Steel, predicted the critical shortage of scrap would continue so long as present OPA policy prevails, but he said he had a "feeling" OPA was going to be on its way out in January. He said if price controls were lifted scrap quotations would probably increase for a while and then level off, as supply and demand came into closer balance.

Robert W. Wolcott, president, Lukens Steel Co., Coatesville, Pa., last week said unless more scrap is obtained operations at Lukens and its subsidiaries, By-Products Steel Corp. and Lukenweld Inc., will have to be seriously curtailed.

Premium Price Plan for Wire Nails May Be Adapted

Incentive payments of $20 a ton for production of wire nails in excess of stipulated quotas will be made if a plan now under consideration in Washington is adopted. The premium payment plan has been discussed at a meeting of officials of the National Housing Agency and Civilian Production Administration with members of the Joint Wire Nails Industry Advisory Committee.

The plan would be effective for six months, from Oct. 1, through March, 1947.

GOVERNMENT CONTROL DIGEST

OFFICE OF PRICE ADMINISTRATION

Price Control Suspension: Suspension of price control over transportation charges of contract carriers by water, effective May 29, has been extended to include charges for transportation of coal except between North Atlantic ports. This action, effective Oct. 1, also suspends control over so-called unregulated common carriers by water, whose maximum rates or charges have not been established or regulated in the past by any other federal, state or municipal authority. (GMPR; OPA-T-5039)

Used Automotive Parts: Effective Oct. 12, rebuilders of used automotive parts may recompute their ceiling prices under MPR-452, using as a base current retail prices for new parts which reflect recent increases in costs. Rebuilt motors are not covered by this action. (MPR-452; OPA-T-5041)

Gasoline Pumps: Manufacturers of gasoline dispensing pumps may increase existing ceiling prices about 5 per cent, raising the total advance since October, 1941, to 21 per cent. (MPR-136; OPA-T-5044)

Metal Beds and Bedsprings: Manufacturers of coil and flat bedsprings and metal beds granted a reconversion ceiling price increase of 6 per cent, effective Oct. 7. (MPR-213)

Farm Machinery: Imported farm machinery and equipment will remain under price control even though it was not included in the list specifically exempted from the decontrol action on Sept. 25. Effective Oct. 3, the general manufacturers and wholesalers farm equipment pricing regulation (MPR-246) was made specifically applicable to imported farm equipment by making MPR-246 supersede the import price regulation. Manufacturers must submit to OPA data that has been required in the past. (MPR-246; OPA-T-5050)

Reinforcing Bars: Producers' ceiling prices for fabricated concrete reinforcing bars raised about $2.50 a ton by increasing the permissible extras for bending and engineering. The increases, effective Oct. 9, are 15 cents per 100 pounds for both light and heavy bending and 10 cents per 100 pounds for engineering. In addition, fabricators may charge published trucking rates when delivery is made entirely by truck. Sellers may pass on increases in maximum arbitrary delivered prices being granted their suppliers at the same time. (MPR-159; OPA-T-5051)

Bronze Screen Cloth: Producers may sell bronze and copper screen cloth to all buyers beginning Oct. 7 on an adjustable pricing basis. (MPR-40; OPA-T-5072)

Price Control Suspension: Air and vent valves such as are used on radiators, plumbing drainage specialties, and plumbing drainage staples, except those subject to MPR-100, have been added to the list of building materials suspended from price control. Also suspended from price control, effective Oct. 4, are the following: Steel castings covered by MPR-41, many used military vehicles, specified used trucks and specified automotive parts and accessories. (SO-129; OPA-6843 and 6846)

CIVILIAN PRODUCTION ADMINISTRATION

Lead: New automobiles and other new equipment will receive preference for the 57,200 tons of lead allocated for the production of electric storage batteries in the fourth quarter of 1946. This represents a drop of 500 tons from the third quarter. Total permitted lead allocations for the fourth quarter amount to 212,500 tons, a 20,000-ton drop from the third quarter total. Consumers were able to obtain only about 182,000 tons in the third quarter out of the 232,500-ton allocations. Allowable lead uses for automotive replacement batteries cut 20 per cent, but small manufacturers who use less than 70 tons of lead per quarter for such use will be permitted to manufacture the same amount of batteries as in the third quarter. (M-38; CPA-LD-321)

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Report of new Council of Economic Advisers, to be ready for President Truman in December, will mark the first attempt to examine the national economy in one piece. Hope expressed it will be made available to the public

IT IS to be hoped that President Truman will make public the report of the new Council of Economic Advisers when it reaches his desk in December. It should be valuable to many students and business leaders because it will mark the first attempt to examine the American economy in one whole piece rather than by individual segments or groups of related segments.

Created by the Employment Act of 1946 (the original "Full Employment" label was discarded as a result of strong objections in Congress), the council has the duty of assisting and advising the President in the preparation of an "Economic Report" to be submitted to Congress early in January and each year thereafter. The purpose is to assist the President in advising the Congress how it may prescribe for a healthy national economy.

As one spokesman puts it: "We are assigned the job of determining the mixture that should flow through the business carburetor to stimulate business and employment."

To Study Industry and Government

Using simple language, the council has this mandate:

1—It is to study the government agencies whose spending or other activities affect business and employment. It will co-ordinate all these separate programs into one unified government program, with recommendations.

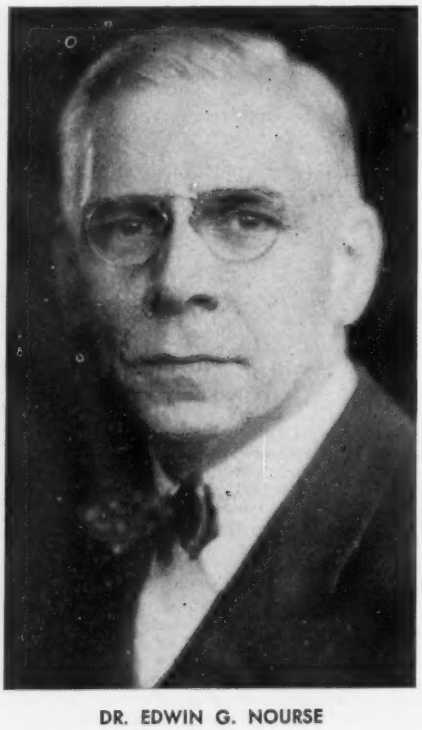
2—It is to study private business with two purposes in mind: To recommend size and timing of government spending and to determine what government assistance is needed to encourage business and employment.

The end result will take the form of recommendations on government spending, labor policies, tax policies, wage policies, the antitrust laws and their administration, the effect of government policies on investment of private funds in industry, and many other matters.

That part of the law that calls on the council to advise ways for helping private industry to give increased employment is especially clear. "It shall be the duty of the council," the law states, "to develop and recommend to the President national economic policies to foster and promote free competitive enterprise, to avoid economic fluctuations or to diminish the effects thereof, and to maintain employment, production and purchasing power."

While government policies and spending programs loom importantly in the nation's economic picture, the council is leaning over backward to carry out the wish of Congress that it consult with representatives of industry. It is studying the plans of industry, and the opinions of business men as to what the government can do to help business.

Of the three men appointed to the council by President Truman, Dr. Edwin G. Nourse and Dr. John D. Clark strongly favor the private enterprise concept but believe certain government controls over business are needed



DR. EDWIN G. NOURSE

The third, Leon H. Keyserling, is in agreement as to the merits of the private enterprise system, but has pronounced views about government's relations to the economy. He believes in strong government controls over business, and he believes in using government spending to prime the business pump.

Mr. Keyserling for years has been a government lawyer. As secretary to Senator Robert F. Wagner, he helped write the prewar public housing legislation and then served as general counsel of the United States Housing Authority which planned and operated the government subsidized housing program in the second Roosevelt administration. Since 1942 Mr. Keyserling has served as general counsel of the National Housing Agency. He believes in the sort of public housing program that would have been created under the Wagner-Ellender-Taft Bill (STEEL of Aug. 5, p. 102).

Dr. Clark started out as a lawyer and became vice president of Standard Oil of Indiana. He left that post to study for a doctorate at Johns Hopkins. Since 1941 he has been dean of the College of Business Administration at the University of Nebraska. He is the author of a book entitled "The Federal Trust Policy," which discusses the antitrust laws.

Dr. Nourse also has written books and numerous articles. His best-known work is "Price Making in a Democracy," published by Brookings Institution. An educator in the field of economics since 1909, Dr. Nourse has been with Brookings since 1923 and has been its vice president since 1942. He wants an enterprise system that is "enterprising" rather than "protective."

"There is a golden mean," he says, "in which thoughtful, responsible, professionally competent leaders of corporate business and organized labor would guide our economic life along channels of high production and democratic sharing of the benefits . . .

"If capitalism and private enterprise are to be maintained, or in some sense restored, the general public will have to be satisfied that this system furnishes them as high a measure of material well-being as can reasonably be expected under any practicably attainable alternative."

Germans Need Steel

United States imports of German goods, under our new policy of helping the Germans to get back on the path to self-sufficiency (STEEL, Oct. 7, p. 88), will consist entirely of the so-called "light" products. They will include toys, china and porcelain products, leather goods, radio cabinets and other wood products, wines, small optical and other instruments, cameras, jewelry, silverware.

There will be no imports of heavy machinery or other heavy products—and the principal reason is the lack of steel. While the Potsdam agreement early this year called for a peacetime steel capacity of

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The Army and Navy are studying our natural caves, such as Carlsbad and Mammoth, in order to determine their usefulness as war-time shelters for industry.

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Weirton Steel Co. now pipes oxygen around its plant like water.

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Centrifugal casting of plastics is claimed by Rezolin Co. of Beverly Hills to offer the same advantages that the process does to the casting of metal.

get ready with CONE for tomorrow

Dow Corning has tested paints made from silicone resins and aluminum powder on diesel manifolds and furnace doors at temperatures as high as 600 degrees Fahrenheit.

get ready with CONE for tomorrow

A joint committee of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers has standardized the sizes of large steam turbines and the first standard unit for electric power generation is now under construction.

get ready with CONE for tomorrow

Federal Telephone and Radio Corp. claim that their new small-size selenium rectifier can replace as many as 29 different rectifier-type tubes now used in radio receivers.

get ready with CONE for tomorrow

International Business Machine Corp. is offering the Chinese a typewriter that will print 5,400 ideographs by the use of 43 keys. An experienced user can write about 45 words per minute (English record 149).

get ready with CONE for tomorrow

American Steel and Wire Co. has a quarter-inch nail that can be used to tack tags to cold steel ingots.

Texaco has developed a new synthetic grease for aircraft instruments, controls, cameras and small motors that is usable from 100 degrees below zero to 300 degrees above.

get ready with CONE for tomorrow

Recent tests indicate that the new railroad car stabilizer, developed by Westinghouse from the gyroscopic tank gun mount, shows great improvement in riding comfort over all kinds of roadbeds.

get ready with CONE for tomorrow

Welded tubular chassis, helical springs, independent axles, 1000 pounds less weight and a lower powered engine are among the details of the proposed new low-priced Chevrolet.

The new Duco Metalli-Chrome automobile lacquer uses particles of aluminum to give a metallic luster and is made in 200 colors.

get ready with CONE for tomorrow

Slight bends in the last threads of a new lock nut made by Grip Nut Co. permit it to turn freely through most of its travel, yet prevent it from loosening when finally set up.

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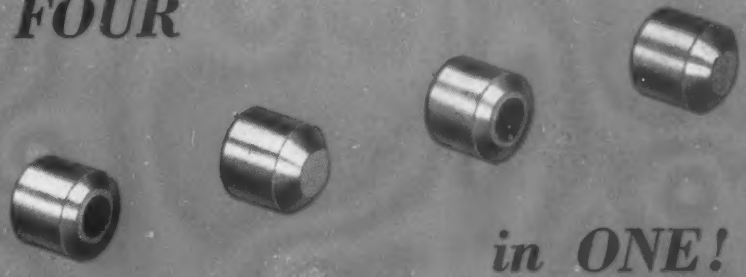
United Engineering and Foundry will pour a 243-ton casting for a press base which will take one month to cool and another month to anneal.

get ready with CONE for tomorrow

University of California scientists have produced a standard for the measurement of length ten times as accurate as the cadmium light ray now accepted by using a light wave from transmuted mercury (made from gold) excited by a high frequency radio beam.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

FOUR



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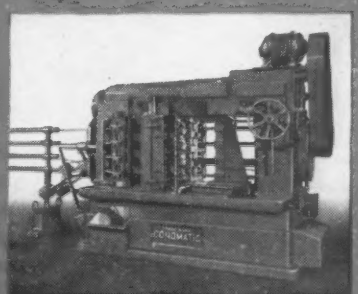

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34

7,500,000 metric tons of ingots annually for all of Germany, it will be a long time before output arrives at that level. Current output still is less than 3,000,000 tons. Brig. Gen. William H. Draper Jr. told STEEL before returning to Germany recently that there will be no substantial increase in German steel output until coal output is increased. General Draper, who is chief of the economics branch, Office of Military Government, United States Zone, says coal output cannot be increased until some time next year and that thereafter the increase will be gradual.

And even when coal output increases, an increase in the German steel output beyond 5,800,000 tons will be permitted only after a further conference between the four occupying powers. In the meantime, rehabilitation of the much-bombed railroads and replacement of ruined bridges, will continue to require much steel.

The German manufacturing potential, according to General Draper, is much greater than had been expected. Although the Army Air Forces obtained photographs indicating hundreds of plants as "totally destroyed" it was found subsequently that under the holes in the roofs approximately 70 per cent of the machinery was still intact. Exposure to the weather has taken a further toll in many cases. There still are huge numbers of machine tools in German plants, either in good shape, or susceptible of quick rehabilitation. But the shortage of steel for a long time to come will prevent its utilization on a scale sufficiently large to take care of urgent needs of Germany and of the adjoining German-occupied countries.

Pay More for Foreign Metal

The government has increased further its losses in buying foreign copper and lead for sale to domestic consumers at OPA ceiling prices. The RFC's Office of Metals Reserve, on orders from the CPA, has closed for 40,000 tons of Chilean copper and 24,000 tons of lead, mostly from Mexico, for fourth quarter delivery.

The copper was bought at 15⅞ cents, Chilean ports, equivalent to 16½ cents New York and 16⅝ cents at Connecticut valley consuming points. This price represents a ⅛-cent increase. The copper will continue to be sold to Connecticut consumers at the OPA ceiling price of 14⅜ cents delivered. The lead price for fourth quarter is 10¼ cents Gulf ports, up ¾ cent from the third quarter price. The lead will be sold to consumers at the OPA price of 8.20 cents, East St. Louis.

Mobilization Plans Stall

Some uneasiness has developed because of signs that the planning for mobilization of industry in event of another war is not being speeded up as expected. On Sept. 17 Richard R. Deupree, chairman of the Army and Navy Munitions Board, told the Navy Industrial Association that the board would work with a large number of industry committees and subcommittees in shaping up its plans. The impression was that this committee structure would be organized over the next couple of months. The Navy Industrial Association created a special 17-man master committee to direct the association's efforts in carrying out the board's assignments.

On Oct. 2 Mr. Deupree told the Army Ordnance Association that the board would not want the assistance of industry committees until "some time in 1947." Before the board can discuss production programs, bottlenecks and other phases of industrial mobilization, he said, it will have to know more about the top command's plans for fighting another war.

Blame for the delay in deciding basic policies is placed on various doorsteps, particularly the White House. The most sympathetic opinion is that the loss of trained and experienced officers by the armed services has been so great as to make it difficult to take care of the regular work of the Army and Navy and at the same time furnish the necessary assistance to enable the Army and Navy Munitions Board to do its planning job effectively.

One of the points apparently requiring a topside decision is whether Donald M. Nelson, as originally indicated, is to have overall direction of the planning activities of the Army and Navy Munitions Board or whether it is the other way around—that is, whether Mr. Nelson is to work for the board, or the board for Mr. Nelson.

The Army Air Forces apparently is not waiting for any policy decisions from the White House or anywhere else in working out its plans to mobilize industry for a world war. AAF materiel headquarters at Wright Field has a good understanding with numerous manufacturers both as to what the AAF probably will want, and on what sort of performance it can count on from each manufacturer.

In the meantime, manufacturers show a sustained and increasing interest in the affairs of the Army and Navy. When the Army Ordnance Department put on a special show for the Army Ordnance Association at Aberdeen Proving Ground on Oct. 3, more than 5000 representatives of industry were present.

ARMY'S NEW CARGO PLANE: Field and crew members at Washington National Airport stand on the elevator of the C-74, the Army Air Forces' largest cargo plane. The elevator is capable of lifting 16,000 pounds. The C-74 can carry a cargo of 45,000 pounds on a 1500-mile trip. For wartime use, it can transport 106 battle-equipped troops. NEA photo

Labor, Materials Shortages Limit Output of Firearms, Fishing Tackle, Golf Clubs

Demand for equipment heavy after four years of restricted manufacture, but producers see little hope of catching up in 1947. Costs of manufacture have advanced 40 to 50 per cent as result of advanced wage rates and material prices

MANUFACTURERS of metal sports goods—fishing tackle, sporting firearms and golf clubs—are facing problems nearly identical with those confronting the makers of automobiles and other hard consumer goods.

Demand is tremendous, due to drastic restrictions of production during the war years, increased consumer purchasing power and an apparently increased interest in outdoor sports.

Materials are short. Sports goods manufacturers usually buy small or moderate amounts of materials and often require special analysis. In some cases they have been forced to accept substitute specifications to obtain material and this has necessitated some rather difficult changes in practice.

Skilled labor is scarce. Worker productivity is low. One leading prewar manufacturer of fishing rods has been unable to reopen its fishing tackle department since the end of the war because of inability to obtain the 500 workers necessary to man the division. Available workers were placed in other departments and unless now unforeseen improvement occurs in the labor market this manufacturer will not be a factor in the 1947 market.

Production equipment has been hard to obtain for many of these manufacturers. Prewar equipment, idle throughout the war years, in some cases has become obsolete.

Costs have advanced tremendously. Most fishing tackle manufacturers estimate this increase in labor costs at around 60 to 65 per cent over prewar. Material costs also are up sharply from 20 to 125 per cent.

In the face of these difficulties, manufacturers are unable even to approach satisfying unprecedented demands for their products. They expect to be able to supply only 75 per cent of the demand in 1947.

Among the most difficult materials for fishing tackle manufacturers has been small size wire in both low and high carbon analyses. Many producers have been forced to turn down business they could have accepted had wire been available.

Sheet steel is required in considerable quantity in the manufacture of reels and tubular rods. The four or five leading manufacturers each require from 20,000 to 30,000 pounds of steel sheet a month, mostly in special analyses. Bronze for reel gears and bearings is in short supply.

The shortage of wire has curtailed the production of fish hooks, a fine art in itself. Many of the tackle and bait manufacturers buy hooks already made, although a few manufacture their own. Hook manufacture involves extremely difficult problems in heat treating to insure that the temper of the hook will be held during the process of point grinding. Altogether there are less than a dozen manufacturers of quality hooks in America. A few still are imported from England and Norway.

Newcomers Have Entered the Field

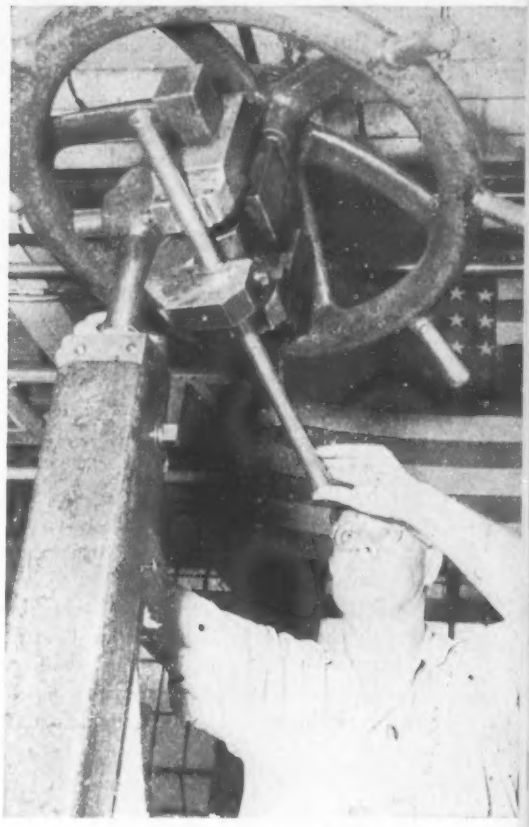
The heavy demand for fishing tackle following the lifting of restrictions on its manufacture drew many newcomers into the field. Often their products were inferior and were offered at prices higher than those asked by the established manufacturers for high quality merchandise. As the output of quality tackle more nearly approaches demand, the newcomers will either be forced to offer higher quality goods at lower prices or retire from the field.

Leading tackle manufacturers figure overall production costs have advanced between 40 and 50 per cent. Selling prices have been advanced between 12½ and 30 per cent. The difference is being absorbed by the manufacturers who believe the larger volume and improved methods will permit such absorption.

Golf clubs, another war casualty, began appearing in stores and on the fairways in limited numbers during the past summer. Here again the demand is far greater than supply in 1946 and anticipated supply for 1947. Practically all golf clubs used today have steel shafts. Before the war these were mostly carbon steel, chrome plated. Since the war, a trend toward stainless is noted. The shafts generally are drawn by tubular goods companies to the specifications of the club manufacturer whose name appears on the club. Such shafts accounted for several thousand tons of steel annually before the war.

Club heads for the "irons" generally are forged mild steel. Often these are made in commercial forging shops, and then assembled on shafts and finished by the manufacturer whose names they carry.

An increase in the use of nonferrous metals in golf clubs is noted since the war. Aluminum putters are becoming fairly common. Heads for some "woods" now are made of aluminum or magnesium. A head with an aluminum case and a plastic filling is winning consid-



No machine has yet been devised that can spot and correct the almost invisible bends in rifle and gun barrels. Skilled old hand at the Remington Arms Co., Ilion, N. Y., inspects and corrects a barrel in a small department through which every barrel must pass for final correction

erable acceptance. However, persimmon wood still is favored as a head material.

For the manufacturers of sporting rifles, shotguns and pistols, materials are the major problem. Normally these manufacturers require around 25,000 tons of steel, plus large quantities of copper and lead. The shortages have necessitated some difficult changes in practice, in heat-treating and use of parts. Another scarcity troubling gunmakers is that of black walnut which is used extensively for stocks and grips.

Reconversion has been a more complicated problem than might be expected in view of the fact rifles, carbines and other guns were turned out for the services by the millions. For war production, skilled personnel, including engineers, was scattered widely to supervise expansion and these men had to be recalled. Key men are now back, although shortage in skilled labor is still a hampering factor in boosting production in some areas. Few machines used in the production of military models are usable for sporting rifles and shotguns.

Widespread modernization is taking place in most firearms plants and new high efficiency machines installed. Numerous developments growing out of the war experience are under study and some are being applied to sporting firearms.

By weight, bars, both soft steels and alloys, are the major steel materials used. Parts are forged, stamped or drawn, and machined to close tolerances. Many are of high tensile and impact specifications. The receiver, a key part in a firearm, holding the firing mechanism, is generally forged, although this is fabricated by stamping in some light models.

Springs are vital for automatic and precision movements while tubing is used extensively for magazines. Numerous screw machine products are required. Rifle and shotgun barrels are drilled and bored; machines and methods used in high speed war production are being utilized with developments under study for further increase in efficiency.

Including manufacturers of pistols there are approximately 25 companies engaged in the manufacture of sporting firearms, employing close to 25,000.

Before the war normal output of this industry was about $35 million annually and once supply of material and labor in some cases improves, this will be substantially increased. Backlog of the industry is large, and with pipe lines to dealers empty, high level production may be expected for at least two years.

Contributing to heavy demand is the fact most older shotguns with laminated or Damascus steel barrels are made obsolete or dangerous by new types of ammunition generating higher pressures and impact. There are thousands of guns with this barrel to be replaced; many are of the old double-barrel hammer type.

Shortages in ammunition, production of which for civilian use was all but halted during the war, continued primarily because of lack of lead, and to considerable degree, brass and copper.

French Iron, Steel Prices Advanced 30-40%

Increase necessitated by upward revision of wage rates and other costs. Freight rates are also advanced

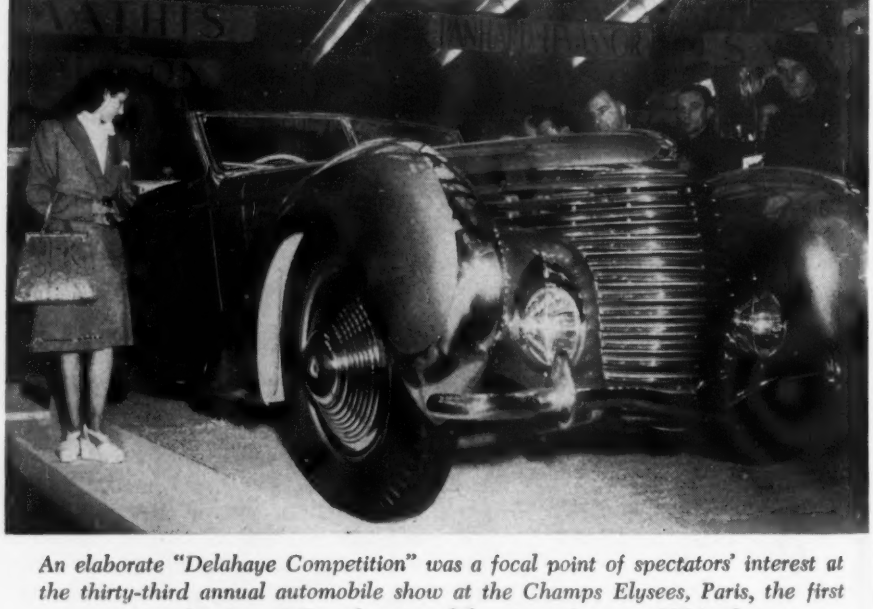
PARIS

FRENCH iron and steel prices have been advanced substantially. The increase amounts to about 40 per cent on pig iron, 36 per cent for bessemer steel and 30 per cent for open-hearth steel products. Certain revisions are to be made on extras also.

New prices, on the basis of delivery from Longwy, are:

	Per Metric Ton	
	Francs	Dollars
Hematite foundry pig iron	3,750	31.25
Hematite refining pig iron	3,700	30.85
Phosphorous foundry pig iron	3,300	27.50
Billets for rerolling, basic bess.	4,875	40.60
Billets for rerolling, open hearth	5,387	44.90
Rails	7,883	65.70
Structurals, basic bessemer	6,169	51.40
Structurals, open hearth	6,896	57.45
Merchant bars, basic bessemer	6,400	53.33
Merchant bars, open hearth	7,000	58.33
Wire rod, basic bess.	7,447	62.05
Wire rod, open hearth	8,098	67.45
Hoops, basic bess	7,153	59.60
Hoops, open hearth	7,872	65.60
Plates, basic bess.	7,883	65.70
Plates, open hearth	8,581	71.50
Medium sheets, basic bess.	8,651	72.10
Medium sheets, open hearth	9,383	78.20
Light sheets, basic bess.	9,592	79.95
Light sheets, open hearth	10,236	85.30

To these prices should be added freight from the basis point; these freight rates vary from one region to another and have been increased recently to 135 per cent of previous rates.



An elaborate "Delahaye Competition" was a focal point of spectators' interest at the thirty-third annual automobile show at the Champs Elysees, Paris, the first major showing of French automobiles since the war. NEA photo

The price increases result from recent increases of wages and of raw materials, and have been applied as from Sept. 1. The government has promised not to authorize any further increases of prices.

Output of coal for the two last weeks of September averaged around 971,000 metric tons. The output per man shift is still below normal and has not reached the level on which the forecasts of the mining department has been based. Imports of coal from the United States during the 35th week of the year were 223,000 tons.

In accordance with the agreement recently passsed with the Belgo-Luxemburg union, France will receive in the next 12 months 180,000 tons of pig iron and steel products, and 24,000 tons of railroad material.

Probe of Surplus Sales Through Agents Planned by Senate Group

O'Mahoney subcommittee proposes to hold hearings on subject soon. Finds deficiencies not wholly agents' fault. WAA's cutting tool agreements with sellers criticized. Sales of machine tools by dealers found satisfactory

WASHINGTON

IN A REPORT entitled "Sale of Surplus Through Agents," the O'Mahoney Surplus Property Subcommittee of the Senate Military Affairs Committee urges the War Assets Administration to push energetically its recently initiated review of the entire procedure of selling surplus property through agents.

The slow progress in surplus disposal to date, the subcommittee feels, indicates that no possible means of disposal should be overlooked. In other words, the services of agents should be used.

However, "serious personnel deficiencies (in the WAA) have resulted in favoritism and lax control over agents' activities," and the subcommittee has referred to the law enforcement agencies some cases "where transgressions of the law appear to be involved." Furthermore, the subcommittee proposes to hold hearings in the near future to air the whole subject.

The electronics sales agreement with agents, the subcommittee finds, "coupled with incompetent, lax and, as contended, sometimes dishonest supervision, has produced extremely undesirable results in the disposal of electronics." Little surplus has been sold and the cost of sales has been high. Priority claimants, particularly veterans, have been grossly neglected. Favored agents and customers have reaped substantial benefits.

High Cost of Sales Cited

As an example, one agent who received his first surplus shipment in May, 1945, and who has received shipments almost every month since, had sold less than 2 per cent of his $353,872 inventory as of June 30, 1946. Total proceeds of his sales were $5597. His expenses amounted to $8921—159 per cent of his sales proceeds. This is not an isolated case. Of the 153 agents, 1 out of 4 cost the government more than their total sales receipts.

"In all fairness to the agents, this situation is not entirely their fault," says the subcommittee report. "Surplus electronics have not been screened before shipment to agents." This situation, plus dilatory treatment of agents' suggestions by the WAA, runs up selling expenses. On the other hand, there has been favoritism in treatment of certain agents. For instance, one agent was authorized to sell equipment for a portable public address system for $18 while another agent's price was $40.05. The same situation was discovered to exist in connection with sales of trucks provided with electronics equipment. Too, the majority of agents were reluctant to serve veterans.

As a result of these disclosures, says the subcommittee, it has received assurances of a thorough personnel housecleaning in the WAA, plus sharp modifications in arrangements with agents. They are to be paid hereafter on a flat commission basis.

The subcommittee also criticized the WAA's cutting tool agreements with agents. These are the agreements covering sales of twist drills, reamers, taps and dies, etc. "Since only established manufacturers are signed up as agents, since they are expected to sell only surplus tools manufactured by them, and since the price charged for such surplus tools is the full market price, there is only a negligible chance of selling substantial quantities of cutting tools in this manner." The subcommittee regards the disposal record to date as adequate testimony to support this contention. The potential surplus of cutting tools amounts to $40 million—on the basis of original acquisition cost. The latest figures show that $28.9 million worth had been declared surplus as of June 28, 1946, while, as of the same date, only $453,000 had been sold, with the proceeds amounting to $187,000.

The manufacturer-agents, numbering about 50, are responsible for receiving, recording, inspecting, classifying, handling, packing, warehousing, pricing and selling, the subcommittee states. All expenses except the actual cost of selling are reimbursed by the government. A commission of 17 1/2 per cent (except 4 per cent when sales are made to the federal government) is designed to cover the selling expenses of the agent.

Costs, the subcommittee states, have been incurred by some agents and charged off to the government even prior to the receipt by such agents of the first shipment of surplus tools. "The largest manufacturer-agent, for example, claimed and received from the government $40,700 to reimburse him for his expense at a time when his sales proceeds amounted to only $431." Frequently the fact is left undisclosed that the tools are government surplus. Instances have been found where agents have removed markings on the tools which would identify them as government surplus. The cost of such removal was charged to the government.

Furthermore, the subcommittee reports, the present agreement serves to entrench the established companies in the cutting-tool field and to prevent the entry of new concerns. This angle, the subcommittee states, already has been noted by the Department of Justice.

Utilization of "approved dealers" for the sale of surplus machine tools is much more satisfactory than in the above cases, says the subcommittee. Machine tools declared surplus up to June 28, 1946, had an original value of $954,537,000. On the same date sales had come to $256,939,000, or about 27 per cent, the sales proceeds coming to $123,403,000. Percentage of sales by approved dealers has risen steadily since the initiation of dealer selling in January, 1946, until in August these agents were selling about 65 per cent of all machine tools. One feature of the program the subcommittee found particularly gratifying was that the competition between the dealers and WAA salesmen has given veterans an opportunity to establish themselves in business.

Changes in Dealer Setups Advised

The subcommittee recommended the following changes in the present machine tool approved dealer setup:

1.—In some regions too many dealers have been appointed. Inactive dealers, now estimated at some 1500 of the 3027 approved dealers, should be eliminated;

2.—The Clayton pricing formula gages depreciation by age alone. "This obvious pricing inequity must be corrected if the more heavily used and poorly handled machine tools are to be sold;"

3.—Buyers often buy machine tools from a WAA salesman and, as a friendly gesture, designate approved dealers as the salesmen even though the dealers named performed no sales service. "The payment of a commission for services not in fact performed is unfair to other dealers and constitutes a fraud against the government;"

4.—In some instances the government has been in arrears in the payment of commissions as long as eight months. "If dealers are to be expected to exert their best efforts in disposing of surplus tools, commissions must be paid promptly by the WAA."

NO JIGS NEEDED

for drilling, boring, reaming and tapping

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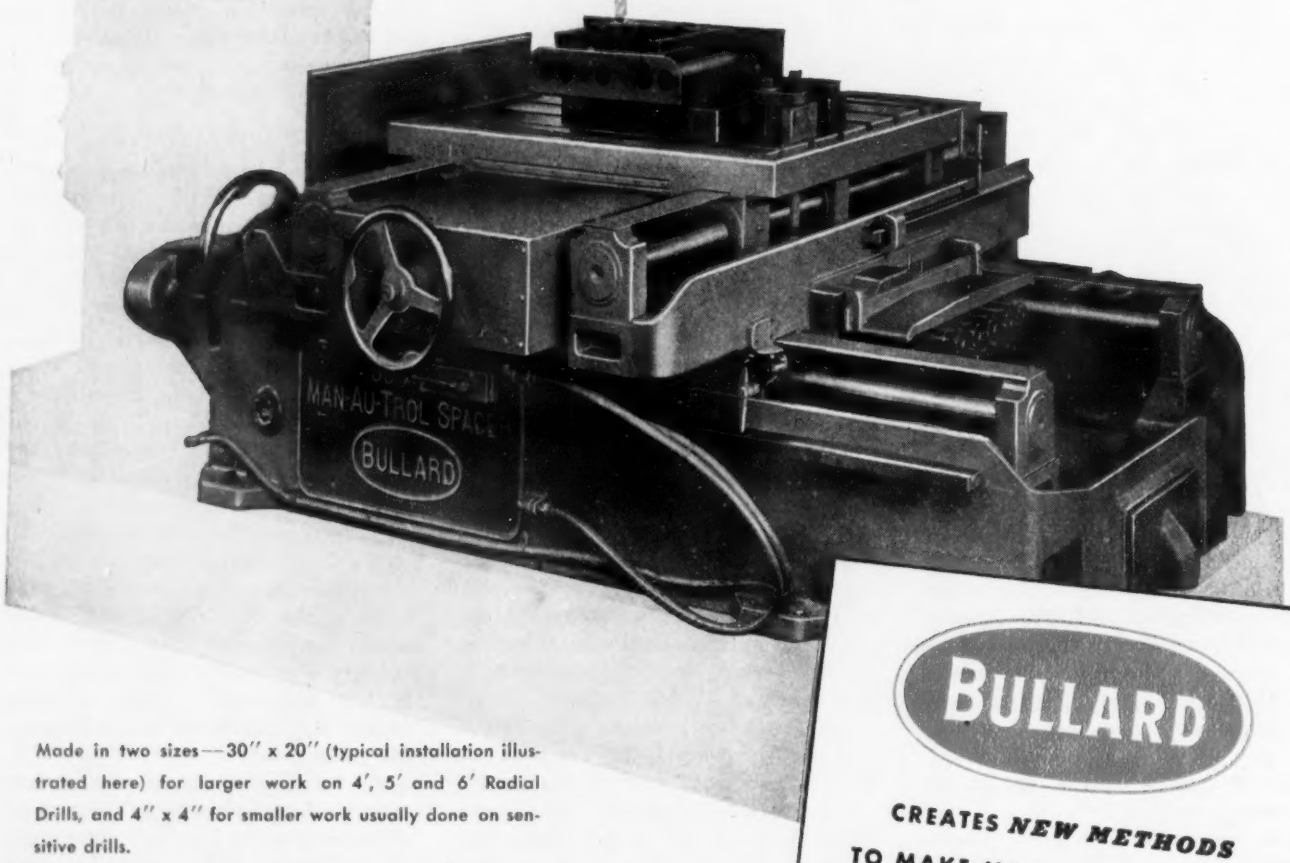
Now . . . with Bullard MAN-AU-TROL Spacers installed on your drills . . . you can start drilling, boring, reaming or tapping just as soon as your engineering drawings are ready.

Working from a master chart, the operator quickly, easily and accurately sets lateral and longitudinal position stops to match the specified pattern of holes. Then, the manually activated Spacer automatically repeats that pattern so that the holes are held *to the highest standard of commercial spacing accuracy.* Easy change-over from job to job and adaptability to an endless variety of work sizes and shapes makes the Spacer ideal for diversified shop schedules.

Consider the time, money and labor you will save when Bullard MAN-AU-TROL Spacers eliminate the need for designing, making, handling, repairing and storing hole-locating jigs. Write for MAN-AU-TROL Spacer Bulletin. The Bullard Company, Bridgeport 2, Connecticut.



Made in two sizes—30″ x 20″ (typical installation illustrated here) for larger work on 4′, 5′ and 6′ Radial Drills, and 4″ x 4″ for smaller work usually done on sensitive drills.

BULLARD

CREATES *NEW METHODS* TO MAKE MACHINES DO MORE

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Layoffs in automotive plants increasing despite unprecedented backlog of orders. Chrysler cuts production 35-40 per cent resulting in furloughing of 35,000 workers; Briggs idles 7000. Action seen as blow to UAW's new wage campaign

DETROIT

INCREASING layoffs in the face of the greatest backlog of demand the automobile industry has ever known make a topsy-turvy situation that has all Detroit puzzled. As mentioned here last week there is now in progress a careful combing of executive, engineering and purchasing personnel which is resulting in the loss of lucrative jobs by many. The follow-up department in one General Motors division, for example, has suffered a 20 per cent reduction in personnel. On top of this Chrysler and Briggs last week instituted a 35-40 per cent reduction in all production schedules which will mean unemployment for an estimated 35,000 in Chrysler plants and 7000 in Briggs, both hourly rate and salaried employees. Some who have received their notices report they cannot expect to be rehired before the first of the year.

Stated reason for the sharp trimming of Chrysler schedules is the acute shortage of sheet and strip steel. Briggs buys steel from 12 different mills and states deliveries from V-J Day to date have been only 58.82 per cent of the tonnage received during the 1941 model year—September, 1940, through August, 1941.

Comparative Output Figures Vary

Chrysler production so far this year is something over 500,000 cars and trucks, or about 57 per cent of the figure for the like period of 1941, which is considerably better than the 38 per cent realized by General Motors and perhaps explains why a steel shortage has not yet become acute in GM plants. However, Ford has produced over 60 per cent of the nine-month 1941 total, Nash over 110 per cent, Studebaker 80 per cent, Hudson over 110 per cent and Packard about 45 per cent. If steel is being allocated on the basis of 1941 consumption these latter companies should be even more hard pressed than Chrysler but to date they have not so indicated.

So there may be other reasons behind the Chrysler cutback, since it does not appear likely steel companies would discriminate against one of their best customers. It may be only a coincidence that UAW-CIO negotiations for a wage boost are scheduled to start just two weeks after a 35 per cent production cut, but certainly the union cannot make out much of a case for higher wages with so many of its men out of work, even though only temporary. That can probably be written off the book right now.

The auto industry may well reason the balance of the year in about this fashion: Production of cars and trucks thus far has been a losing proposition, tempered only by the cushioning effect of tax carrybacks. There is little incentive to pushing up production under present conditions when it only means more losses. Next year industry will be on its own with no great assistance from the tax collector; hence it is vitally necessary to trim organizations, balance inventories and otherwise put plants in shape so that they can be off to a flying start after Jan. 1. A little less than three months' time remains to effect this readjustment and unless it is carried out effectively there is not much chance for operating at a profit next year.

Figuring on this basis it would not surprise many here to see the entire industry closed down tight by Dec. 1 and perhaps remain idle most of that month except for making what equipment and tooling changes are necessary for the 1947 model. These will not be extensive and probably might be made in a few days but it may take longer than that to trim all the production sails for the rough water ahead.

It appears now that all the leading passenger car builders will introduce some styling changes for 1947, even Ford which earlier had announced no changes. They will involve such things as new, relocated or removed moldings, new instrument panels, ornaments, paint treatments and other minor modifications which will serve to differentiate the 1947s from the 1946s.

General Motors is expected to present its first real postwar models when the changeover is made to 1948 cars. Cleveland plant of the Fisher Body Division already is working on dies for the 1948 models which are still 10 to 12 months away as far as announcement to the public is concerned, according to E. J. Gleason, Cleveland plant manager. Cars which will be offered as 1947 models probably will show little change from their 1946 predecessors, except possibly in trim and front-end treatment.

Fisher Body at Cleveland is turning out components for 2200 bodies daily—mostly for Chevrolets—and would step up to 4000 daily were sufficient flat-rolled steel available. This plant uses about 900 tons daily and is getting half this amount. Lack of steel in proper sizes also is retarding production. Employment now is 4600 workers and will be increased 50 per cent when materials are available. Presses and other equipment shipped to other parts of the country and abroad during the war have been replaced.

Next year also will see an end to expedients like substituting more costly alloy steel for carbon steel just because the former happens to be available, bringing in parts by express and air express instead of regular freight, and buying parts from surplus lists and often reworking them. How costly these devices can be is seen in the report that Ford currently is losing $200 on every Ford and Mercury built, $600 on each Lincoln and $1000 on the Lincoln Continental, with the total operating deficit this year amounting to something like $40 million.

Automobile Production

Passenger Cars and Trucks—U.S. and Canada

Estimates by Ward's Automotive Reports

	1946	1941
January	121,861	524,037
February	83,841	509,332
March	140,777	533,878
April	248,318	489,856
May	247,620	545,321
June	214,511°	646,278
July	330,764°	468,897
August	359,180°	164,793
September	345,250°	248,751
Estimates for week ended:		
Sept. 21	80,972	60,615
Sept. 28	85,495	77,035
Oct. 5	90,165	76,820
Oct. 12	92,000	79,065

° Preliminary

Materials Bartered

A great game of you-scratch-my-back-and-I'll-scratch-yours is going on these days in the motor industry, and probably many other industries as well. Up against it for pig iron after a blast furnace burned through its lining, Ford, for ex-

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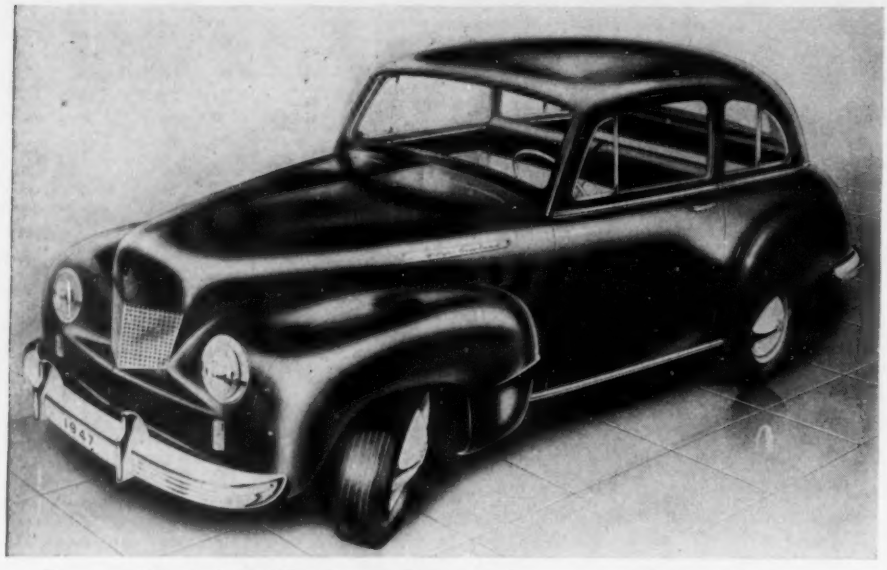


First model of the Willys-Overland 6-70 sedan was unveiled recently to industrialists, editors and educators at company's Toledo plant. Car is scheduled for mass production early in 1947

ample, negotiated a trade of thousands of tons of coke for an equivalent tonnage of pig iron. General Motors last month worked out a trade of 15,000 tons of scrap for an equivalent tonnage of pig iron. Practically all production scrap has been channeled to specific mills, presumably in exchange for steel tonnage. These practices likewise will probably be terminated by the end of the year, since they are often uneconomical, involving cross hauling and completely disrupting the normal pattern of materials flow.

Willys Shows New Model

Willys-Overland put on a real party in Toledo recently for 400 top-flight industrialists, financiers, educators and civic leaders. Feature of the event was the unveiling of the first model of the 1947 Willys-Overland passenger car. In styling it is ultra-conservative. Wheelbase is 104 inches, weight 2500 pounds. It will be priced competitively with the lowest-priced Ford, Chevrolet and Plymouth, according to President James D. Mooney.

Independent suspension is used on all four wheels. In the front system, the traditional axle is eliminated and in its place is a transverse, semielliptic Dow-type spring with rubber inserts at each end of the leaf. These inserts eliminate the need for lubrication. Each end of the spring is connected to the lower end of the steering knuckle support, the upper end of which is mounted to a control arm, operating in rubber bushings, and this in turn is bolted to the frame, providing vertical motion of the wheel during jounce and rebound.

In the rear, the differential is mounted in rubber on the frame of the car. Swinging-type rear axles extend from a ball joint mounting on either side of the differential to the rear wheels. They are held in place by a longitudinal, semi-elliptic Dow-type spring on both sides of the car, providing for independent up and down motion of the wheel as in the front suspension.

Power is derived from a new 6-cylinder L-head engine, with 3-inch bore and 3½-inch stroke, developing 70 brake horsepower at 400 r.p.m. Design of both engine and car has been integrated with that of the Willys jeep, station wagon and truck lines, so that as many parts as possible can be made interchangeable and thus permit more economical manufacture. It is the hope of Mooney and his staff of engineers to avoid yearly model changes in this new passenger car. As improvements are developed they will be incorporated in manufacture at once, but the initial tooling expense will carry through for several years.

Visitors at the W-O affair were conducted on tours of the sprawling Toledo plants, a fleet of a hundred or more jeeps being made available for use of the guests. There are 20-odd plants on the property, with well over 4,000,000 square feet of floor space. Most of them are pretty well along in years but they are kept in good condition. One is being torn down to make room for a new press shop which will be equipped with 72 presses ranging in size up to 1500 tons. An innovation in this structure, still some distance from completion, is the use of underground tunnels to handle scrap and to permit servicing utilities, die cushions, etc. Eventually all body stampings for the W-O car and truck models will be produced here. I the present Hayes Mfg. Co. is making station wagon bodies, American Central the jeep bodies.

Production of jeeps currently is proceeding at a rate of 46 an hour, with one shift operating. Station wagons have been under assembly for about three months, and production averages about 60-70 daily. Mr. Mooney estimates operations are now only about 25 per cent of capacity, figuring two shifts on assembly lines, but in spite of this and a five-month shutdown this year arising from strikes in parts suppliers' plants a small profit is expected for the fiscal year ending Sept. 30. In view of this creditable performance, it might be easily possible to make a price reduction in the jeep and station wagon once production reaches a better level. Export shipments of jeeps are averaging around 22 per cent of the total output.

Nash Drops Light Car

Very little has leaked out about it, but Nash had been actively planning a new entry in the small-car field, probably as a competitor with the proposed Ford and Chevrolet light cars, both o which have been dropped. The Na venture was to be on a 100-inch wheelbase, compared with 112-inch size of its present smaller or 600 model. Plans have been abandoned now, one report being to the effect the entire industry made a tacit agreement to stay out of the short-wheelbase field. Nash, incidentally, is proceeding with plans for new assembly plants, one near Sao Paulo, Brazil, and another in Mexico City.

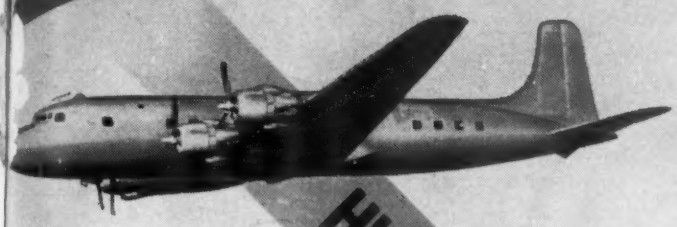
K-F Dealers Sell Dishwashers

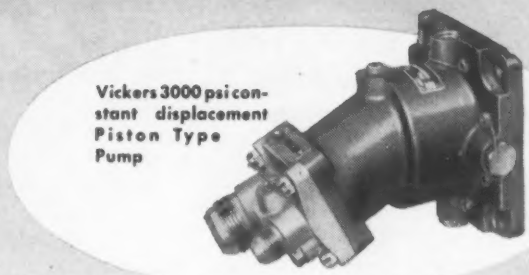
Kaiser-Frazer automobile dealers will handle distribution of a new hydraulic motorless dishwasher which the company will build in a Bristol, Pa., plant. It will sell for under $100, is built principally of aluminum and operates on normal household water pressure.

World Has 42 Million Autos

Recent tabulation of world passenger car and truck registrations shows a total of about 42,000,000, with 75 per cent of them in the U. S. United Kingdom is second with 2,200,000, France third with 1,500,000, Canada fourth with just under 1,500,000 and Russia next with something over a million, not counting several hundred thousand lend-lease vehicles. U. S. total figures to one car for every 4.5 persons, contrasted with Hungary, for example, where there is one car for every 2120 persons.

VICKERS Hydraulic Pumps
AND CONTROLS





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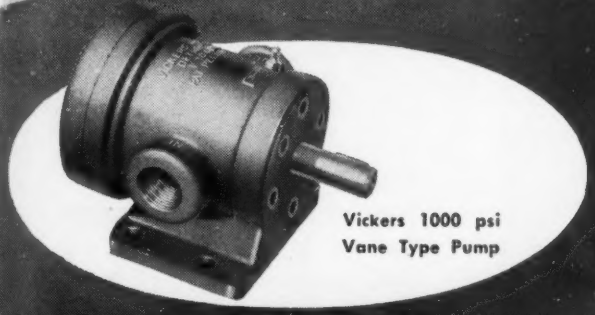

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Between these extremes, Vickers Hydraulic Equipment is serving industry in countless ways . . . wherever accurate, dependable and easy control is needed. In addition to the thousands of more widely known applications on metal working machinery, Vickers Hydraulic Pumps and Controls are used on construction equipment, motor buses, printing presses, agricultural machinery, marine equipment, oil well pumping units, textile and paper machinery, trucks, etc. Vickers Application Engineers will be glad to discuss with you how hydraulics can be used to your advantage.

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GM Setting Up Locomotive Repair Shops

Electro-Motive Division establishing chain of branches to place service closer to its railroad customers

A CHAIN of locomotive branch repair shops to serve users of General Motors diesel locomotives is being established by General Motors Corp.'s Electro-Motive Division, La Grange, Ill.

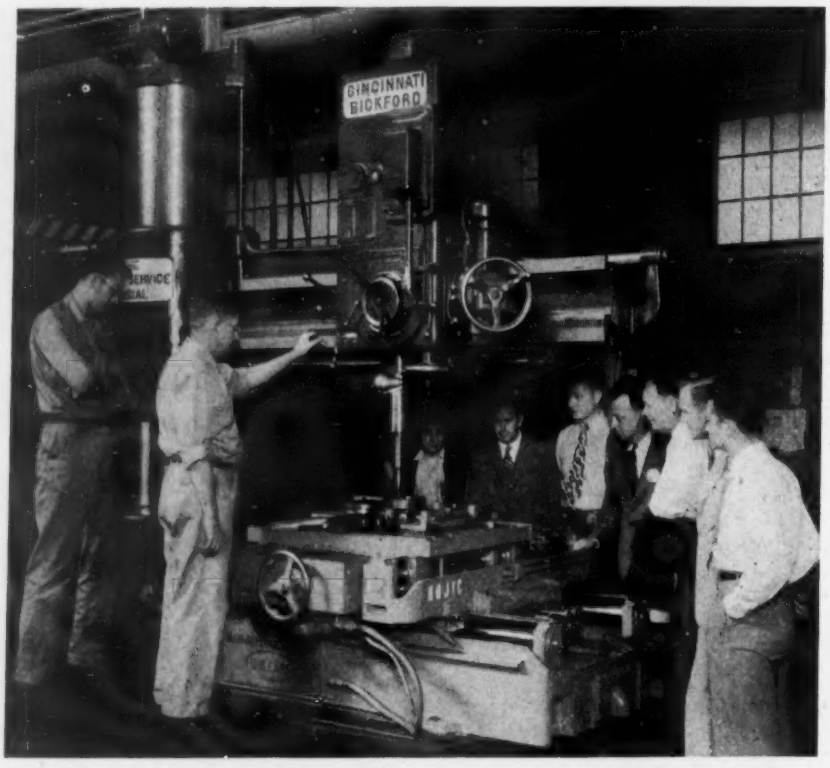
Through such a chain the advantages of using original factory machinery and methods plus the economies of quantity production will be brought closer to railroad customers, the division pointed out.

One of these branch repair shops has been operating at Emeryville, Calif., since Jan. 1, 1945. Two other shops are under construction, one at Jacksonville, Fla., and one at Baltimore. These two shops will be operating before the end of 1946 if present building schedules can be maintained. The fourth link in the national chain is the service repair shop section of the main Electro-Motive plant at La Grange, which serves railroads in the central part of the United States.

"We have learned through our experience at Emeryville," said W. D. Davis, parts manager for Electro-Motive Division, "that there is a strong demand from many railroad users of General Motors locomotives for factory repair of certain parts and assemblies, especially those in which the economies and quality of factory production methods afford natural advantages over individual railroad set-ups to do the same work. This includes such work as rebuilding traction motors and generators, the repair of injectors, governors, pumps and like mechanical and electrical assemblies."

Realizing that the time loss and shipping costs incident to transporting parts and assemblies back to the main plant was to some extent offsetting the advantages, the Electro-Motive Division decided to establish repair facilities so close to the operating field of the equipment that the time lag and shipping costs no longer will be deterrents, Mr. Davis pointed out.

As one of its steps in placing service and parts closer to railroad users, Electro-Motive Division has established a new regional field service with headquarters in St. Louis. Milton H. Gardner, formerly regional service manager at Chicago, is now regional service manager at St. Louis, reporting to G. E. Anderson, regional manager at St. Louis. In addition, the Electro-Motive Division has broadened its district representation to provide more complete field service coverage.



MACHINE TOOL DEMONSTRATION: New Bullard Man-Au-Trol spacer is demonstrated on the Super Service Radial at the Cincinnati Bickford Tool Co. under the sponsorship of the Cincinnati office of Motch & Merryweather Machinery Co., Cleveland. The radial is processing three different parts on the 20 x 30-in. spacer, drilling and counter boring with an accuracy of plus or minus .0005-in. Left to right: R. O. Hunderford, Bullard Co., Bridgeport, Conn.; W. Schmidthorst, operating the radial; John Gries, Cincinnati Bickford; John M. Krings; C. H. Hagberg, Bullard Co.; W. E. Mundhenke, Motch & Merryweather; E. V. Grumman, Bullard Co.; Chester A. Dones, Motch & Merryweather; R. M. Henshaw, Cincinnati Bickford

GE To Manufacture Ballasts at Oakland

OAKLAND, CALIF.

General Electric Co. soon will begin manufacture of ballasts for fluorescent lamps at its Sixty-ninth Avenue plant in Oakland, marking the first time this equipment has been made on the West Coast.

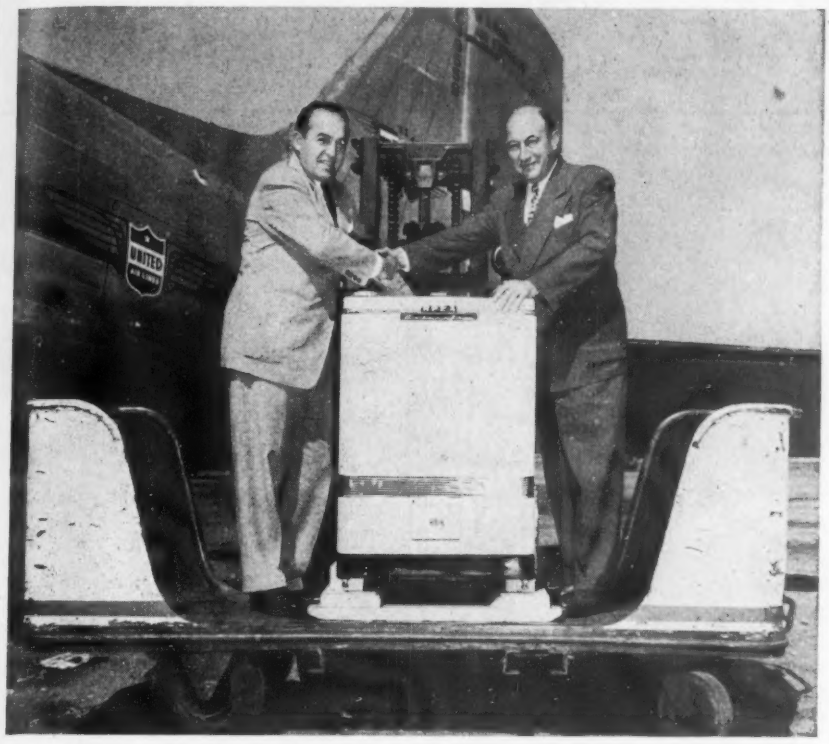
Ballasts are small components of fluorescent lamps which perform the function of starting the lamp, and, after illumination, maintain the light at level intensity.

Worth Steel Plans River Front Expansion Program

Worth Steel Co., Claymont, Del., recently purchased three tracts of land containing more than 50 acres adjoining its property. With the acquisition of this land, the company now owns more than 600 acres at Claymont, of which 160 lie between the Pennsylvania Railroad tracks and the Delaware river. The company is planning future development of this property along the river front.

Foundrymen's Association Forms New Sand Division

Formation of a sand division of the American Foundrymen's Association has been announced by S. C. Massari, technical director. Chairman of the new division is Dr. H. Ries, Ithaca, N. Y., former head of the geology department, Cornell University; vice chairman is P. E. Kyle, professor of metallurgy, Cornell University; H. F. Scobie, AFA educational assistant, is serving temporarily as division secretary.



NEW AUTOMATIC WASHER: First Apex automatic washer arrives in New York by plane where it is received by Kamel Hassan, left, eastern sales manager for Apex Electrical Mfg. Co., Cleveland, and Victor H. Meyer, New York distributor. Although not yet in large-scale production, the Apex automatic is attracting attention because of its "bouncing basket" washing action

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Westinghouse Electric Corp., Pittsburgh, will hold a stockholders' meeting Dec. 5 to consider merger with Benolite Corp., Manor, Pa., and B. F. Sturtevant Corp., Boston, both wholly owned subsidiaries. Also to be considered will be rearrangement of the capital stock structure.

—o—

Hydropress Inc., New York, has opened an office at 1065 Gas & Electric Bldg., Denver.

—o—

Steel Founders' Society of America, Cleveland, has published a revised *Directory of Steel Foundries in the United States and Canada,* containing names and addresses, executive personnel, production facilities, etc., of all known steel foundries in the two countries.

—o—

Federal Products Corp., Providence, R. I., has acquired the sole manufacturing rights for the Federal-Metricator Air Gaging system, and manufacturing facilities, formerly located at Ann Arbor, Mich., have been transferred to Providence.

—o—

Tydings, Lynch & Lorenz Inc., Baltimore, has been organized to engage in marine and industrial steel work, such as steel fabrication and repairs, boiler and condenser retubing, etc.

—o—

Seal-Peel Inc., Detroit, has sponsored a round-the-world flight of a load of television tubes, precision instruments, chinaware, etc., whose only protection against breakage in flight is the company's Seal-Peel, a plastic coating on each item which is said to guard against breakage, corrosion, rust, temperature extremes, etc.

—o—

Philco Corp., Philadelphia, has begun radio and phonograph production at its new $2,250,000 plant in Philadelphia. The plant contains 300,000 sq ft of floor space.

Birmingham's Plants Flooded With Business

Backlog of orders sufficient in several cases to assure uninterrupted production for up to five and six years

BIRMINGHAM

ORDER BOOKS of Birmingham's industry are bulging with "on the line" business so far ahead that in some instances even speculative commitments are abandoned.

Bookings are sufficient, in several cases, to assure uninterrupted production for up to five and six years. An example is the Tennessee Coal, Iron & Railroad Co., whose rail mill at Ensley, Ala., has been producing consistently at capacity, and yet will require another four years at the current rate of operations to clear its books. Demand exceeds production to such a great extent that the company has been finding it necessary to turn down some offerings and to give regular customers only part of their normal requirements.

In varying degree the same situation exists with respect to plates, shapes, bars, wire, sheets and a number of other products.

The cast iron pipe industry is booked, it is indicated, about a year in advance if it could operate normally or six days a week. However, on current curtailed production schedules the industry is making indefinite commitments through March, 1948.

Pig Iron Completely Booked

"Several years" ahead is the nearest estimate possible to obtain on pig iron. One foundry reported it has been besieged by nationally known manufacturers to accept programs of castings production which would occupy the company not less than four or five years.

Such plants as that of the Chicago Bridge & Iron Co. at Birmingham have "tailor made" orders at least a year in advance, as have Goslin-Birmingham Mfg. Co. and several other similar industries of the Birmingham district. Pullman Standard Car Mfg. Co. has a backlog of approximately 10,000 cars.

Pressure will persist indefinitely, it is indicated, especially since programs, such as the TCI expansion, are delayed considerably because of material and labor shortages.

Industrial Building Programs Lag

Shortages of construction materials, machinery and equipment prevent carrying out of postwar expansion plans

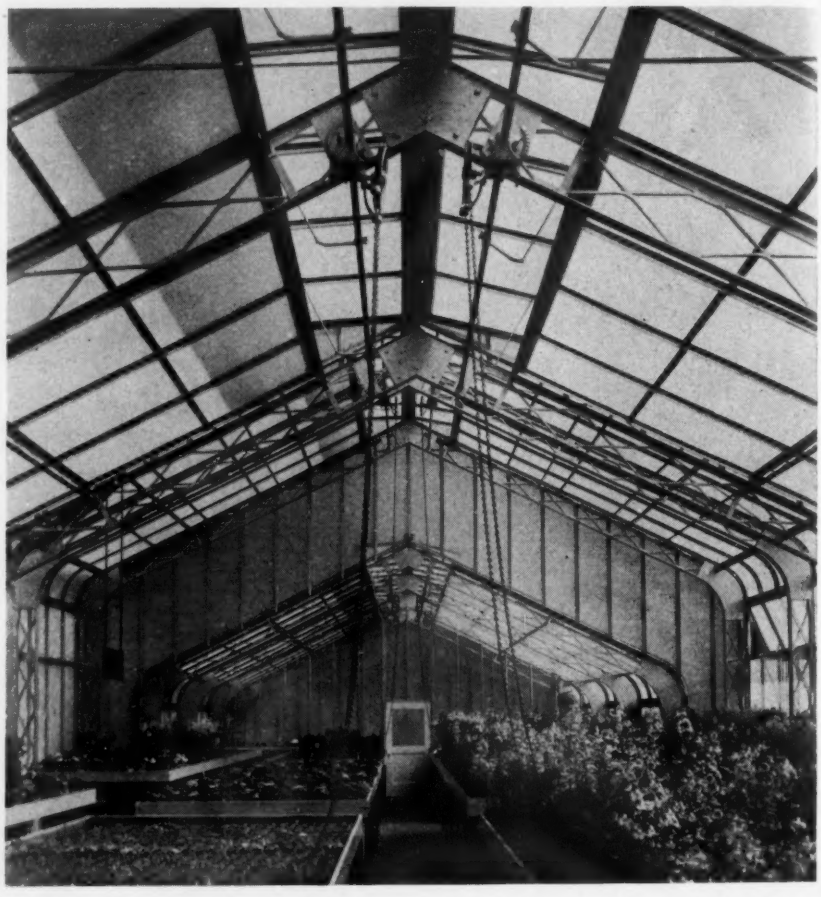
SAN FRANCISCO

SHORTAGES of building materials, plus a scarcity of new machinery and equipment, are impeding progress of industrial construction totaling millions of dollars on the West Coast.

Plans for new building and expansion of old facilities began appearing long before V-J Day and have been accumulating at an increasing rate ever since. However, many companies are finding it is a difficult and time consuming task to put their programs into effect.

For example, one of the West Coast's largest manufacturers of building materials itself is a victim of the building material shortage. This company at the end of the war had projected a plant expansion program totaling between $4 and $5 million. Subsequently plans for another plant addition brought the total amount to $6.5 million. However, in its fiscal year which ended last June 30 the company had been able to complete only $500,000 of plant additions and replacements.

Nearly every delay conceivable has been encountered by the firm in getting building materials. It has experienced difficulty in getting construction permits. But perhaps the greatest bottleneck has been in machinery and equipment. For example, a boiler for a power house expansion was scheduled to be delivered nearly a year ago. It was delayed until "sometime this year," and at present the company does not expect delivery until next spring, and it's not even certain of that.



SAVES WEIGHT: Use of Bethlehem expanded web sections in the framing of this hothouse at Los Angeles is claimed to have saved at least 50 per cent in weight over conventional structural material

Other Programs Held Up

A large West Coast oil company has experienced similar setbacks. A year ago it announced a $20 million postwar expansion program, which has been increased further since. At present only about 12 per cent of the program has been completed, and only 20 per cent of the remainder is now in actual process of construction. Material shortages, due to strikes or government regulations, have slowed up the remainder of the work indefinitely. Nearly 4 per cent of the program has been deferred.

Another company, a producer of paper and paper products, reports it is behind schedule on its $15 million expansion program. It also reports an even greater lag in equipment deliveries.

In large construction jobs, nearly any sort of a shortage can cause a delay or postponement of the work. Some firms report that such small items as nails are the cause; concrete has been another bottleneck. Scarcity of steel, however, is one of the major difficulties.

Even though the federal government, through the Civilian Production Administration, is reinstituting its iron and steel priorities system, West Coast observers are none too hopeful that the great need for steel here will be satisfied by this move. It has become apparent that the West Coast must suffer along with the rest of the country until steel supply begins to equal demand.

The shortage of steel, however, is particularly acute on the West Coast because of its distance from the principal steel producing centers.

The effect of the steel shortage on Coast building activities will be felt severely once sheet metal fabricators begin closing down. It is believed that large numbers of fabricators will have to close their doors soon unless the supply is increased. Heavy pressure is being brought on Washington officials at present to force shipments of steel, especially sheets and strip, from eastern mills to the West Coast. However, how successful these moves will be remains to be seen. It is believed that part of the decision to reinstitute the priorities system resulted from demands of western representatives in Congress.

Despite the none-too-promising outlook for construction in the immediate future, plans for new industrial expansion continue to mount.

An illustration is that of leading West Coast utilities. Four of the largest systems operating in California now have scheduled more than $610 million of construction and plant expansion. The largest program by far is that of Pacific

Telephone & Telegraph Co., which has planned work totaling $400 million. Pacific Gas & Electric Co. has scheduled $160 million of expansion. Southern California Edison Co. has a $35 million program, and Pacific Lighting Corp., more than $15 million.

Public vs. Private Power Is Issue in Washington

SEATTLE

Lines are sharply drawn between public ownership and private power interests over Initiative 166 on which the voters of Washington will pass at the November election. The measure ostensibly provides that Public Utility Districts must submit to popular vote all proposed purchases of private power facilities. But private power companies whose properties are being sought by PUDs are strongly opposed on the ground that public ownership agencies will prefer to duplicate services rather than ask voters to approve the purchase of private plants by public agencies.

In its argument against the initiative, the Puget Sound Power & Light Co. makes this assertion: "166 plays into the hands of the Bonneville Administration which it is understood has for some time been advocating that the PUDs construct duplicate facilities. The Bonneville Administration is setting an example for the PUDs in the matter of unfair competition by proposing to serve some of our larger industrial customers at rates cheaper than it would sell such power to the company for resale."

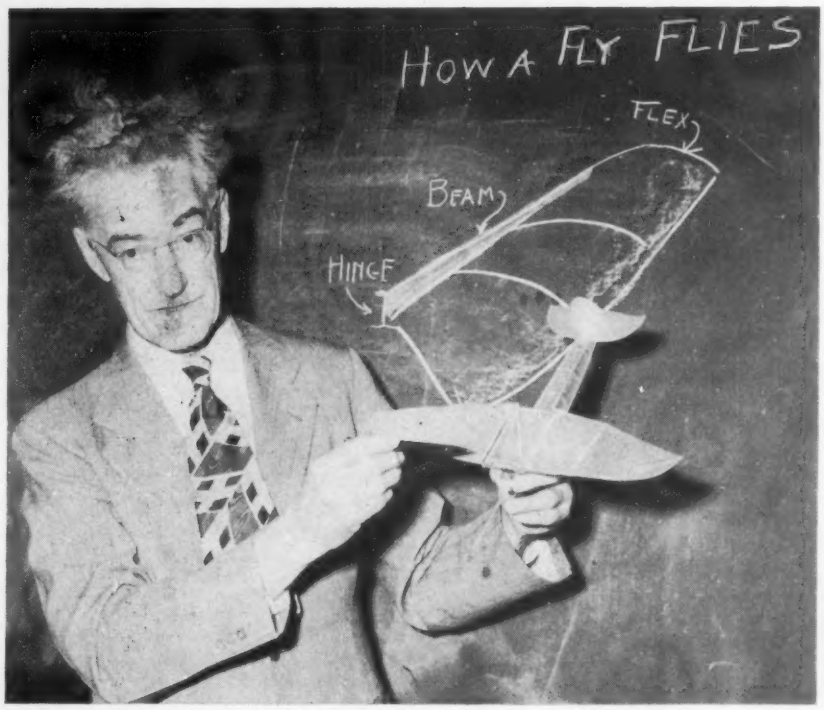
The fear of existing private companies is that they will be forced out of business by the construction of duplicate facilities by public funds.

Seidelhuber To Build New Fabricating Plant

SEATTLE

Seidelhuber Iron & Bronze Works, 1421 Dearborn St., plans early construction of a manufacturing plant, 150 x 200 feet, in the South Spokane St. area for production of hot water tanks, range boilers and water heaters. Present quarters have been outgrown.

Seidelhuber recently announced plans for erection here of a $3½ million sheet rolling mill, plans by Engineering Associates, Seattle, and Freyn Engineering Co., Chicago. This project is expected to be undertaken early next year.



HOW TO FLY LIKE A FLY: William B. Stout, automotive and aircraft designer, told the Society of Automotive Engineers in Los Angeles that plane designers might well take a lesson from bugs and flies and build aircraft with moving wings. To illustrate what he meant, Mr. Stout produced a flying model of a moving wing airplane which buzzed around the meeting hall. Insects, he pointed out, are more efficient flyers than birds; they are more maneuverable, carry a greater pay load in ratio to wing area and make proportionately higher speeds

Shipping Strike Ties Up Steel On West Coast

Thousands of tons strike-bound on docks and in idle vessel holds. May cause layoffs in construction, manufacturing

LOS ANGELES

WITH thousands of tons of steel lying on wharves or in holds of some 35 cargo vessels strike-bound in Los Angeles harbor, scores of manufacturers in the area last week expressed fears that layoffs of workers in construction and manufacturing industries will become inevitable if the work stoppage continues.

Los Angeles spokesmen for the maritime unions forecast that the stoppages will be of lengthy duration. It was disclosed that orders have gone out to the workers involved to "dig in" for a long siege.

The tie-up cut short rumors that inventory accumulation among manufacturers in the southern California region had begun to reach somewhat of an equality with sales for the first time since the war. The reports on inventories, however, were not specific as to actual manufacturing fields affected.

"The most critical housing area in the United States," was the phrase applied to the Los Angeles area last week by Wilson W. Wyatt, national housing expediter, who visited the region on a tour of inspection.

Mr. Wyatt promised that new regulations of the FHA will ease construction programs for smaller residential units for veterans. This, he said, should result in more rental units becoming available to the thousands of married veterans, many of whom are industrial workers.

In connection with the Wyatt analysis as it related to actual filling of jobs in industry through home building, the research department of the Chamber of Commerce made public a study of marriage and birth rates culled from various national sources, which facts, it was stated, have an important influence upon major economic trends.

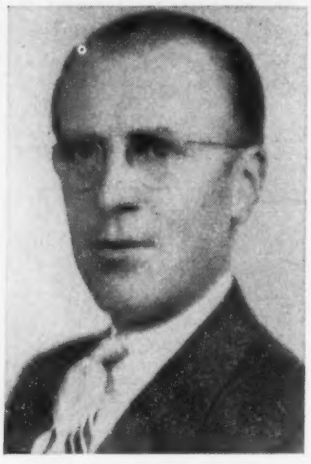
In varying degrees, it was pointed out, all industries will feel a larger demand for their products from the wartime baby boom.

The estimates were based upon the fact that 11,000,000 infants were born in the four years 1941-1944, some 1,700,000 more than would have arrived on the basis of the birth rate in 1939.

Men of Industry

CARL R. HELLSTROM

GEORGE R. KLOPPMAN



V. R. BATES

Carl R. Hellstrom has been elected president, Smith & Wesson Inc., Springfield, Mass., succeeding the late **Harold Wesson,** who held that post since 1920. Other directors elected are: **Frank H. Wesson, David Murray, Daniel B. Wesson, Reginald Webster, Lee Wesson** and **Clarence Brooks.** Mr. Hellstrom has been with Smith & Wesson since 1931, first as engineer consultant, and later as general superintendent, works manager and vice president. He has been in active charge of plant operations since 1940, and in 1941 was elected to the board.

—o—

R. B. Tripp, vice president, Ohio Forge & Machine Corp., Cleveland, has been elected a director of Reynolds Wire Co., Dixon, Ill.

—o—

Arthur W. Frank has been appointed director of research, with headquarters in Milwaukee, Hevi Duty Electric Co., Milwaukee. He was Chicago district manager for the company. **Lawrence S. Tilden,** formerly assistant district manager, succeeds Mr. Frank as district manager in Chicago.

—o—

Norman J. Froelich has been appointed general manager of sales, Portsmouth Steel Corp., Portsmouth, O., succeeding **John K. Boll,** who has retired. Mr. Froelich was eastern district sales manager, with offices in Chicago, for Reynolds Wire Co., Dixon., Ill. Mr. Boll had been manager of wire product sales for Wheeling Steel Corp., Wheeling, W. Va., since 1923, when that company first built the Portsmouth wire mill. On July 1, when Portsmouth Steel Corp. took over the wire mill, Mr. Boll became general manager of sales for Portsmouth Steel. His resignation took effect Sept. 30, but he will remain with the corporation on a part time basis for the next few months. **Frank W. McLain** has been appointed assistant general manager of sales for Portsmouth. He was on the staff of Fostoria Screw Co., Detroit.

—o—

George R. Kloppman has been elected secretary and treasurer, National Screw & Mfg. Co., Cleveland. He succeeds **Eugene E. Griese,** who has resigned as secretary and treasurer, after almost 38 years of service. **Harold H. Hummel** has been appointed assistant treasurer of the company. Mr. Kloppman was director of industrial relations for the company, and has been succeeded in that position by **Richard K. Leukart.**

—o—

E. M. Neely has joined William M. Bailey Co., Pittsburgh, in a sales and engineering capacity. Mr. Neely was assistant to the superintendent of blast furnaces, Carrie Furnaces, Rankin, Pa., Carnegie-Illinois Steel Corp.

—o—

E. C. Coombs has been appointed assistant sales manager, Federal Machine & Welder Co., Warren, O. He had been chief service engineer and assistant manager of sales engineering for the company. Mr. Coombs joined Federal in 1923. Prior to taking charge of the Sales Engineering Division, he had been in charge of the production planning and scheduling department since 1940.

—o—

John E. Fontaine has been appointed manager at Houston, Tex., for Graybar Electric Co., New York. Mr. Fontaine, who served as manager at Beaumont, Tex., since January of 1944, joined the company in 1928 at Dallas, Tex. At Houston, he will replace **C. G. Matthews,** who is retiring after more than 30 years with the organization. **Lynn A. Haley** has been appointed manager at Beaumont, replacing Mr. Fontaine. Mr. Haley has been head of the quotation department at Houston for Graybar.

—o—

Robert D. Kelley has resigned as vice president and director, Detroit Steel Corp., Detroit, and general manager, Craine-Schrage Steel Division. He will remain with the organization in an advisory capacity. **V. R. Bates** has succeeded Mr. Kelley as general manager of the Craine-Schrage Steel Division of Detroit Steel Corp. **J. M. Gillard** has been appointed assistant general manager of the division. **Howard V. Clark,** vice president in charge of sales of Detroit Steel, has been elected director of the company. **J. B. Ribakoff,** former executive vice president of the corporation, who has been on leave of absence, has returned to active duty as manager of the firm's operations in the eastern area. His headquarters will be in Worcester, Mass.

—o—

Kenneth J. Moran has been named to represent Canedy-Otto Co., Chicago Heights, Ill., in the Midwest territory. **John W. Beachem,** recently released from the Army, has been appointed to represent the company in the Southern territory.

—o—

George J. Papas has been appointed general manager of purchases for Rheem Mfg. Co., New York. He will make his headquarters in New York, and will direct purchases for the company's 11 plants in the United States.

—o—

John M. Lambert has been appointed manager of consumer sales, York Corp., York, Pa. He will be supported by **Fred C. Wood,** manager of air condi-

BRONZE BOLTS

STAND THE STRAIN

Suspend 3 Miles of Drill Pipe

In modern oil wells the draw works are often required to lower and hoist more than 15,000 feet of drill pipe. Think of it! 3 miles of pipe weighing 30 pounds per foot!

Brakes on the draw works are constantly in use sustaining the entire load. For this rugged service Raybestos-Manhattan, Inc., have perfected a brake block and fastening device which depends upon Harper Bronze Bolts to withstand the shearing force of this tremendous weight.

Harper Everlasting fastenings made from high strength non-ferrous and stainless steel alloys are consistently specified by engineers to fight damp, rust-producing atmospheres and corrosive chemicals that would soon weaken common steel.

You may have a fastening problem in your industry. Harper's engineering service can advise the type of fastening best suited to do the job. Call on them to help you.

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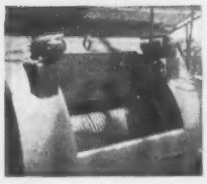
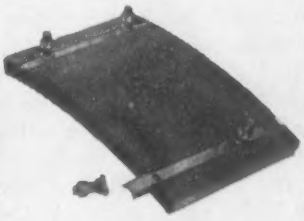


Draw Works on a modern oil well.



Bronze bolts hold Raybestos-Manhattan blocks securely. May be loosened easily for installation of new blocks.

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Everlasting Fastenings
Chicago

MORE THAN 4850 TYPES OF EVERLASTING FASTENINGS IN BRASS, NAVAL BRONZE, SILICON BRONZE, MONEL, STAINLESS

tioning sales, and **James Scott,** manager of refrigeration sales. Mr. Lambert joined the York organization in 1918. He was sales manager of the company's Baltimore office, and subsequently manager of its national service office in Washington.

—o—

Joseph H. Fulmer has joined the engineering department of Pennsylvania Salt Mfg. Co., Philadelphia. He was formerly with Ethyl Corp., New York, and Sharples Chemicals Inc., Philadelphia.

—o—

Robert M. Field has been named vice administrator for staff operations, and **Clifton F. Robinson,** vice administrator for field operations, War Assets Administration. Both positions are newly created. Mr. Field had been an officer and director of various subsidiaries of United States Steel Corp., New York. Mr. Robinson had been a deputy administrator since he joined WAA last May.

—o—

B. E. Drury Jr. has been appointed sales manager, Wilson Foundry & Machine Co., Pontiac, Mich. Mr. Drury joined the Wilson organization in 1942, and had recently been assistant to the vice president in charge of sales.

—o—

A. J. Rosebraugh has been appointed sales manager, Industrial Radio Division, Philco Corp., Philadelphia. He will have headquarters in Detroit, and will be in charge of all radio receiver sales to the automobile industry. Mr. Rosebraugh will be assisted by **Martin F. Shea,** who has been a Philco representative in Detroit for many years. Mr. Rosebraugh joined Philco in 1929, and 2 years ago was appointed Southwest Division manager for the company, with headquarters in Kansas City.

—o—

David G. Anderson has been appointed acting head of the engineering staff, National Founders Association, Chicago. For the last 20 years he served as foundry engineer at the Chicago plant of Western Electric Co., New York.

—o—

Harold E. Adams has been appointed assistant to the vice president and general sales manager, Ekco Products Co., Chicago. He had been western sales manager for Toastmaster Products Division, Elgin, Ill., McGraw Electric Co. He was with Toastmaster more than 11 years.

—o—

B. M. Loewenstein has been appointed general sales manager, Howard Foundry Co., Chicago. He heads the sales activities of all four Howard plants. During the war, Mr. Loewenstein was head of the Castings Division of the gun turret plant, Emerson Electric Mfg. Co., St. Louis. He also went to Mexico to help organize foundries under construction there. After his return, he joined the Howard organization.

—o—

Sherman Miller, since 1941 chief mechanical engineer at the Schenectady, N. Y., works, American Locomotive Co., New York, has been appointed vice president in charge of production engineering. **Raymond J. Finch** has been named chief mechanical engineer. Mr. Miller will maintain headquarters at Schenectady, where he has been active with the company since 1907. He entered the drawing room of the Schenectady plant that year, and from 1916 to 1941 was superintendent of the general drawing room. Previously, he had been with the Dunkirk, N. Y., plant of the company.

—o—

Paul S. Strecker has been appointed director of personnel, E. W. Bliss Co., Detroit. He will direct the company's labor and industrial relations at its five plants. Mr. Strecker had 13 years of personnel work with General Motors Corp., Detroit. He was the first personnel director of Fisher Body Division's Grand Rapids, Mich., plant. He left General Motors to become associate professor of general engineering at Purdue University, Lafayette, Ind. Later, he was in charge of personnel for various plants of Nash-Kelvinator Corp., Detroit.

—o—

Harry A. Winne, vice president in charge of engineering policy, General Electric Co., Schenectady, N. Y., has been appointed to direct activities of the General Electric Nucleonics Project, the designation given the work on atomic energy which the company is undertaking for the government. The project includes nuclear research and development at Schenectady; at the Hanford Engineer Works near Richland, Wash., operation of which G. E. took over for the government on Sept. 1; and at other locations. It will be administered by a three-man Nucleonics Committee, consisting of Mr. Winne, **Dr. Zay Jeffries,** G. E. vice president and general manager of the chemical department, and **Dr. C. G. Suits,** vice president and director of the research laboratory. **B. R. Prentice** has been assigned to the Engineering Policy Division of the company executive department, where he will assist Mr. Winne in co-ordinating engineering activities in the field of atomic energy and on other assignments. Mr. Prentice had been engaged in engineering work for the company's apparatus department at Schenectady. **F. B. Cliffe,** assistant comptroller has been appointed to take overall responsibility for accounting matters relating to the Nucleonics Project. **F. E. Baker** has been given direct responsibility for accounting matters at the Hanford Engineer Works, under Mr. Cliffe, and **S. W. Scowbo** is responsible for Nucleonics Project accounting matters at Schenectady. **W. H. Milton Jr.** was recently named administrator of the Hanford works for G. E., and **D. H. Lauder** was appointed works manager. **T. F. Perkinson** has been appointed assistant manager of the Transportation Engineering Division of General Electric's Transportation Divisions, Erie, Pa. He joined G. E. in 1924. **J. G. Trudinger,** plant engineer of the company's River Works, West Lynn, Mass., has retired after 39 years with the firm. He headed the Maintenance & Plant Engineering Division for more than 20 years.

PAUL S. STRECKER

—o—

W. H. Hartman, for 46 years purchasing agent of Cleveland Electric Illuminating Co., and its senior employee in years of continuous service, has retired. He is succeeded by **J. D. Hogg,** formerly purchasing agent for Montreal Engineering Co.

—o—

John W. Craig, general works manager, Richmond, Ind., plant, Crosley Corp., Cincinnati, has been presented the Naval Ordnance Development Award for exceptional service in the research and development of gun sights and directors.

—o—

David B. Starrett has been named manager, Standard Machine Division, Royal Typewriter Co. Inc., New York. Mr. Starrett, who also remains eastern sales manager of the company, will have charge of sales operations for all domestic standard typewriters.

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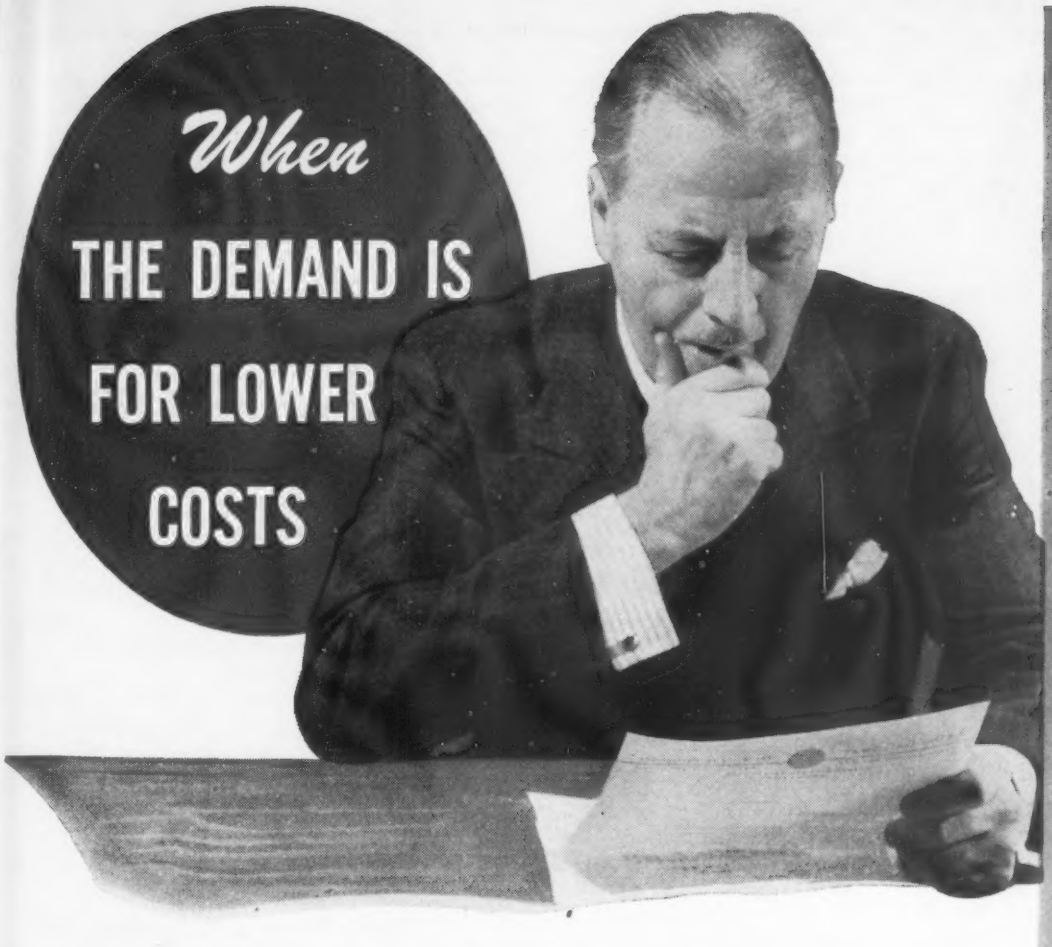
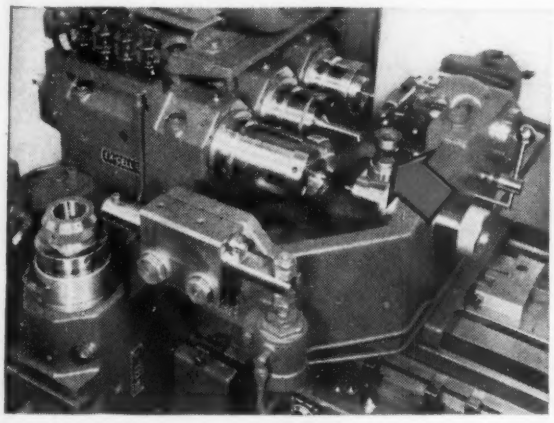
Howard K. Nason has been promoted to associate director, central research department, Dayton, O., Monsanto Chemical Co., St. Louis. He has been with

When THE DEMAND IS FOR LOWER COSTS



...Scrap Your Obsolete Equipment!



Close-up of fixture and tooling set-up to turn O. D., face end, bore pin holes and finish sides of ring grooves of refrigerator compressor piston (note part indicated by ◄►). Four operations are executed on four pistons during one cycle of this Ex-Cell-O Precision Boring Machine.

Obsolete machines are wasteful in today's competitive picture. Designed to help manufacturers meet the cost problem, Ex-Cell-O Precision Boring Machines frequently offer increased production, less handling of parts, smaller floor space requirements, and greater economy through multiple operations. These savings are the result of Ex-Cell-O's many years of experience in the manufacture of precision machine tools. In boring, as in many other metal-working operations, Ex-Cell-O engineering can show you the way to lower unit costs, through machines designed to meet your production problem.

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EX-CELL-O for PRECISION

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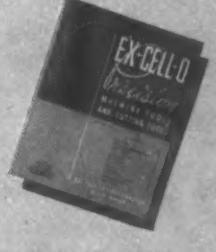
EX-CELL-O makes

- Standard and Special Multiple Way-Type Precision Boring Machines
- Multiple Drilling and other Special Purpose Machines
- Precision Thread Grinding Machines
- Precision Lapping Machines
- Broaches and Broach Sharpening Machines
- Continental Cutting Tools
- Tool Grinders
- Hydraulic Power Units
- Grinding Spindles
- Drill Jig Bushings
- Drill Chip Breakers
- Inspection Fixtures
- Fuel Injection Equipment
- R. R. Pins and Bushings
- Pure-Pak Paper Milk Bottle Machines
- Aircraft and Miscellaneous Production Parts



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EX-CELL-O CORPORATION • DETROIT 6

Monsanto since 1936, and since 1944 has been director of development of the central research department in Dayton. **Edward M. Hubbard, Milton Kosmin** and **Ralph R. Wenner** have been appointed group leaders at the department. Mr. Hubbard is in charge of analytical work at Monsanto's central research laboratories. He joined the firm in 1939, at St. Louis, and was transferred to the Dayton laboratories in 1941. Mr. Kosmin joined the company in Dayton, in 1935. He will be responsible for research work on synthetic wetting agents and detergents. Mr. Wenner, who joined Monsanto in Dayton in 1942, will be responsible for process engineering and evaluation work at the laboratories.

—o—

Frank Mac Millen has been appointed director of information, American Standards Association, New York. He was on the staff of the *New York Times*, and prior to that, he was financial news editor with the Associated Press.

—o—

James D. Greensward has been named assistant to **William C. Johnson,** vice president of General Machinery Division, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Greensward joined the company in 1922. In 1936 he was placed in charge of sales of the Switchgear Division, and in 1942 was named assistant manager of the central station and marine department. For the last 3 years, he had been assistant to the treasurer in charge of contract terminations.

—o—

Charles B. Thornton has been appointed director of the planning office of the newly created Planning & Control Division, Ford Motor Co., Dearborn, Mich. He will serve under **Lewis D. Crusoe,** recently named head of the new division. During the war, Mr. Thornton, a colonel, served in an advisory capacity to **Gen. Henry H. Arnold** and **Assistant Secretary of War Robert A. Lovett.**

—o—

Instrument Society of America, Pittsburgh, has elected the following new officers: **C. O. Fairchild,** president; **Carl Kayan,** first vice president; **J. B. McMahon,** vice president; **Ralph Munch,** vice president; **Hugh Ferguson,** treasurer; and **Richard Rimbach,** executive secretary.

—o—

Walter S. Beecher has been named district sales manager of the new southwestern district sales office, with headquarters in Dallas, Tex., Jas. H. Matthews & Co., Pittsburgh.

—o—

Sir Wilfrid Ayre has been appointed to the Iron & Steel Board, British Ministry of Supply. He is the last of seven members to be appointed to the board, and represents consumer interests. Sir Wilfrid is chairman and managing director, Burntisland Shipbuilding Co. Ltd.

—o—

Roy C. McKenna, president and chairman of the board, Vanadium-Alloys Steel Co., Latrobe, Pa., has been appointed chairman for the western half of Pennsylvania for the Committee for Economic Development.

—o—

Robert T. Dunlap has been elected executive vice president, Colorado Fuel & Iron Corp., Denver. Mr. Dunlap was vice president in charge of all manufacturing operations, Wickwire-Spencer Steel Co., New York, prior to the consolidation of the two companies.

—o—

Samuel S. Auchincloss, vice president, AMF Automatic Pinspotter Division of American Machine & Foundry Co., Brooklyn, N. Y., has been placed in charge of all operations of the pinspotter division in Buffalo.

—o—

Harry A. Sutton has been appointed assistant to the president and engineering advisor, Ryan Aeronautical Co., San Diego, Calif.

—o—

Orland J. Engle has been elected comptroller, Pullman-Standard Car Mfg. Co., Chicago, succeeding **Richard W. Higgins,** a veteran of more than 54 years service with the company. **George C. Thiele** has been appointed assistant to the vice president of Pullman-Standard. Mr. Higgins will continue with the corporation in a consulting capacity.

—o—

Harrison Wood has been appointed New York district manager, SKF Industries Inc., Philadelphia. He succeeds **John D. Williamson,** who resigned because of ill health, after having served as head of the district for 23 years. Mr. Wood had been assistant district manager since 1941, and prior to that, was a field engineer for the firm. He joined SKF in 1923. The New York district includes New York City, the southern tier of New York state and northern New Jersey.

—o—

Dr. Courtney C. Brown, head of the Petroleum Economics Division, Standard Oil Co. of New Jersey, New York, has been appointed vice president of World Trade Foundation of America. He will be consultant for research activities.

—o—

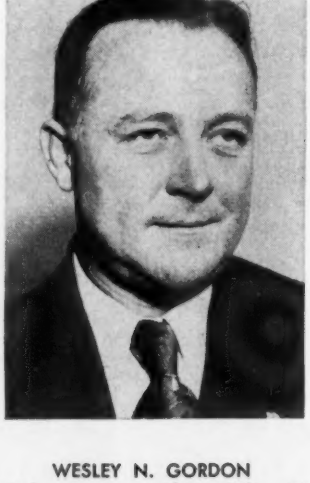
Albert T. Lawson has been appointed chief industrial engineer, Jones & Laughlin Steel Corp., Pittsburgh, succeeding **C. R. Dobson,** resigned. Mr. Lawson joined Jones & Laughlin in 1916, at its Pittsburgh Works engineering department. Since 1930, he has been in charge of the industrial engineering department at the company's Aliquippa, Pa., works. He is a member of the Association of Iron & Steel Engineers.

—o—

James M. Surbrook has been elected vice president, and will continue as treasurer, Peninsular Grinding Wheel Co., Detroit. He has been with the company 10 years, and has been treasurer for 4 years.

—o—

Bert S. Taylor has been appointed factory manager of the new Plastics Production Division, B. F. Goodrich Co., Akron. Mr. Taylor, who joined the company in 1925, had been general superintendent of the Processing Division since 1938, with the processing of plastics in the Akron plants under his direction. In his new position, he will have charge of the new plastics processing plant the com-



WESLEY N. GORDON
Appointed manager, Alloy Sales Division, United States Steel Supply Co., Chicago, noted in STEEL, Oct. 7 issue, p. 104.

OTTO A. PFAFF
Who has been elected president, Foundry Equipment Manufacturers Association, noted in STEEL, Oct. 7 issue, p. 86.

C. M. TAYLOR

Elected executive vice president, Lincoln Electric Co., Cleveland, noted in STEEL, Oct. 7 issue, p. 104.

FREDERICK A. PURDY

Appointed manager of the new Los Angeles plant, Joseph T. Ryerson & Son Inc., Chicago, noted in STEEL, Oct. 7 issue, p. 104.

A. P. LERCH

Appointed chief tool design engineer, Hyster Co., Portland, Oreg., noted in STEEL, Oct. 7 issue, p. 102.

pany is building near Marietta, O., as well as other plastic production activities. **Robert H. Wattleworth** has been named general superintendent of the Processing Division, succeeding Mr. Taylor. Mr. Wattleworth, who joined the Goodrich company in 1926, had been manager of processing departments since 1944.

—o—

Eugene W. O'Brien has been elected to head American Society of Mechanical Engineers for the coming year. He succeeds **D. Robert Yarnall,** of Philadelphia, and will take office following the annual meeting early in December. Mr. O'Brien is vice president, W.R.C. Smith Publishing Co., Atlanta. ASME also has named the following five regional vice presidents: **Prof. Linn Helander,** of Manhattan, Kans., head of the department of mechanical engineering, Kansas State College; **Thomas S. McEwan,** of Chicago, vice president of McClure, Hadden & Ortman Inc., Chicago; **Albert R. Mumford,** development engineer, Combustion Engineering Co., New York; **Edward E. Williams,** of Charlotte, N. C., general superintendent of steam plants, Duke Power Co.; and **Alton C. Chick,** of Providence, R. I., assistant vice president, Manufacturers' Mutual Fire Insurance Co., re-elected regional vice president of ASME to serve 1 year. The following four men are newly named directors at large of the society, to serve 4 years: **Frederick S. Blackall,** president and treasurer, Taft-Pierce Mfg. Co., Woonsocket, R. I.; **Bruno V. E. Nordberg,** executive engineer, Nordberg Mfg. Co., Milwaukee; **Wilber A. Carter,** technical engineer of power plants, Detroit Edison Co., Detroit; and **Lewis F. Moody,** professor of hydraulic engineering, Princeton University, Princeton, N. J.

—o—

O. A. Tucker has been appointed vice president in charge of operations, Pacific Car & Foundry Co., Renton, Wash. For the last 14 months, he was vice president and general manager, **Everett Shipbuilding & Dry Dock Co.,** Everett, Wash., subsidiary of Pacific Car & Foundry Co. His successor at the Everett yard is **Robert LeBlanc,** who was chief estimator. Mr. LeBlanc has been with Everett since 1942, and prior to that time was with Pacific Car & Foundry Co.

—o—

Ralph E. Flanders, the chairman of the board of directors of Jones & Lamson Machine Co., Springfield, Vt., and president of the Federal Reserve Bank of Boston, has been made an honorary member of Society of Mechanical Engineers.

—o—

D. A. Forward has been elected to the board of directors, Boeing Airplane Co., Seattle; and Boeing Aircraft Co., subsidiary of the former firm. Mr. Forward is senior vice president, National City Bank of New York, and has been closely identified with the aviation industry for the last 10 years. **Richard M. Morgan** has been appointed manager of Boeing Aircraft's sales office at Wichita, Kans.

—o—

David Novick has been appointed director, Bureau of Demobilization, Civilian Production Administration, succeeding **G. Lyle Belsley,** who has resigned to become assistant administrator of the National Housing Agency.

OBITUARIES . . . .

D. T. Williams, 91, retired founder of D. T. Williams Valve Co., Cincinnati, died in that city recently. He organized the company in 1904, after having served as vice president and general manager of Lunkenheimer Co., Cincinnati.

—o—

John F. Davis, 76, Chicago district manager, Titusville Iron Works Co., Titusville, Pa., died in Evanston, Ill., Oct. 4.

—o—

George P. Wardley, 61, who retired in 1945 as assistant vice president, Carnegie-Illinois Steel Corp., died in Joliet, Ill., Oct. 5. He had been with the company 30 years, 15 of which he was superintendent of the Joliet coke plant. During the last 10 years, he specialized in industrial relations.

—o—

A. Elton Holcomb, 68, until 3 years ago sales manager, Shovel & Crane Division, Koehring Co., Milwaukee, died Oct. 5, in Indianapolis. He joined the company in 1919.

—o—

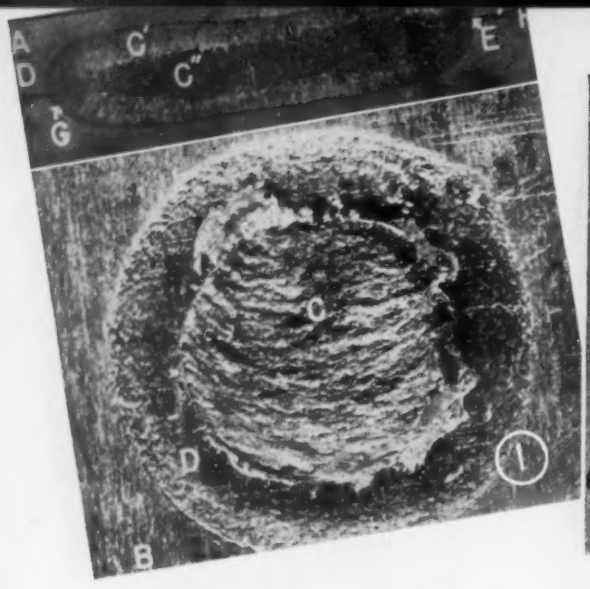
Meredith Poole, 65, director of purchasing, E. C. Atkins & Co., Indianapolis, died recently. He had been with the firm 46 years, and was a member of its board of directors.

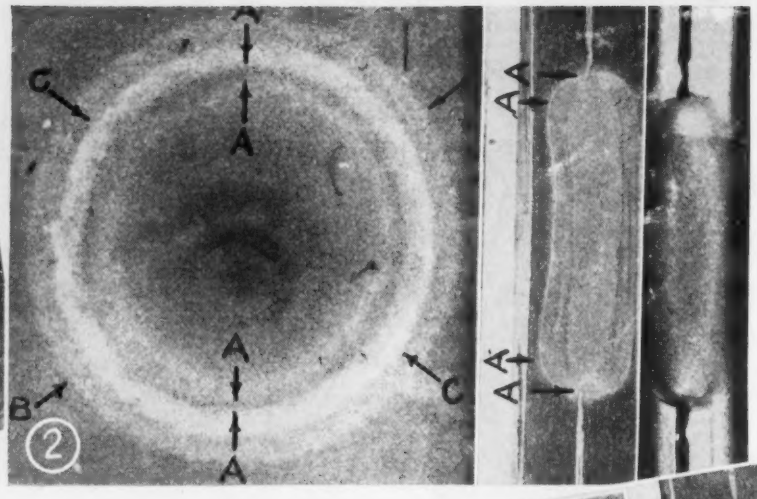
—o—

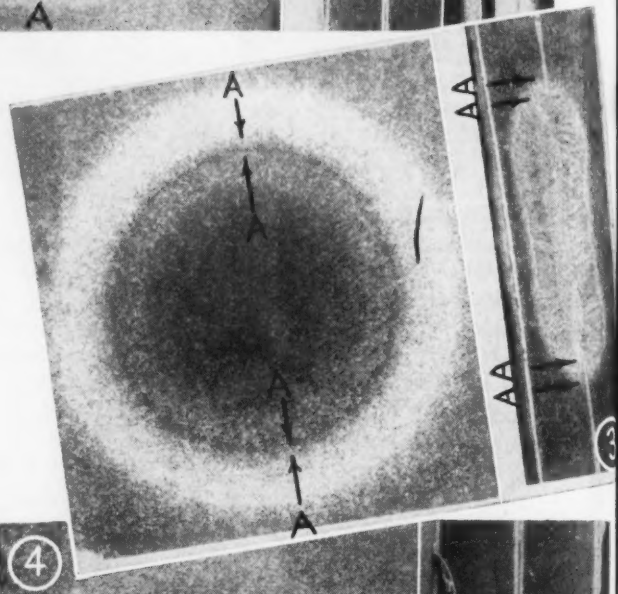
Loring Brown, 53, production manager at Franklin, Ind., for Noblitt-Sparks Industries Inc., died recently in Indianapolis.

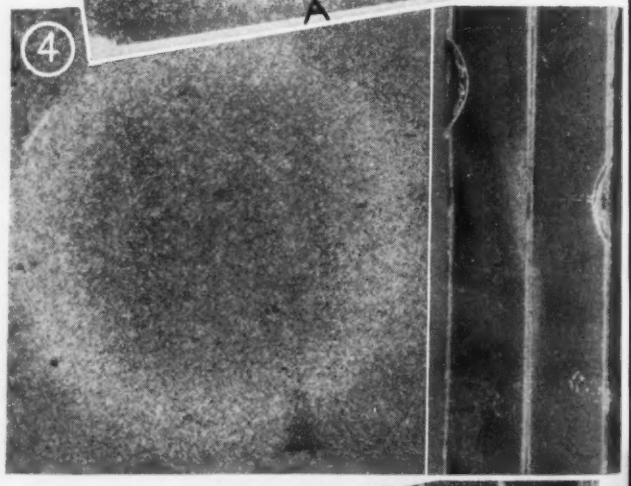
—o—

Dr. Robert Lemuel Sackett, 77, dean of the School of Engineering, Pennsylvania State College, from 1915 to 1937, died recently in New York. A consulting engineer as well as teacher, Dr. Sackett was a pioneer in the development of sanitation and highways in the Middle West.









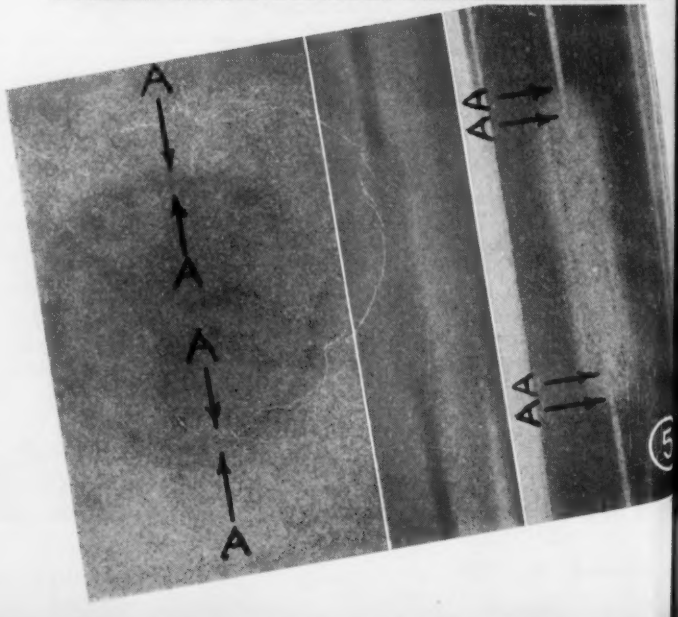


Fig. 1—Faying surface (upper) and cross section (lower) of a typical spotweld in 24S-T Alclad aluminum alloy, showing significant regions of welds (A) Parent 24S-T aluminum alloy, (B) Alclad layer; (C) cast alloy weld nugget; C', dentritic zone; C'', equiaxed zone; (D) corona region; (E) Alclad inclusion; (F) nugget penetration; (G) heat-affected zone in parent material; (H) faying plane

Fig. 2—Radiograph (upper) and section (lower) of a large spotweld, showing typical rings on radiographic image. Dark ring A-A: Outlines the spotweld nugget at the faying plane, and the boundary between the weld nugget material and the parent alloy. Light band B-B: Outlines the corona region at the interface. White ring C-C: Reveals pools of copper-rich eutectic segregated in heat-affected parent alloy.

Fig. 3—Radiograph and section of a normal spotweld in 0.040-0.040-in. 24S-T Alclad aluminum alloy. Outer boundary of the prominent radiographic dark ring A-A shows the boundary between the nugget and the parent material. Inner boundary of the dark ring A-A shows the inner extremity of the Alclad inclusion into the nugget at the faying plane. Weld strength is proportional to the area within the dark ring

The equiaxed zone appears darker than the dendritic zone on the radiograph. The corona ring appears as a light band surrounding the weld nugget region

Fig. 4—Radiograph and section of a "dud" spotweld in which the weld nugget is absent. The dark ring A-A is not present on the radiograph. The weld has no strength save that of corona bonding

Fig. 5—Radiograph and section of a small-diameter spotweld. The small nugget diameter is shown by the small diameter of the radiographic dark ring A-A. When the dark ring is of small diameter (say less than 3 times the sheet thickness), the weld nugget cannot develop the strength required of a nugget of normal size

Fig. 6—Radiograph and section of a small-diameter spotweld with a large Alclad inclusion into the weld nugget at the faying plane. Inner extremity of the Alclad inclusion is shown by the inner boundary of the radiographic dark ring A-A. Extent of the Alclad inclusion is revealed by the width of the dark ring, whose outer boundary corresponds to the boundary between the nugget and the parent material. Such an excessive Alclad inclusion weakens the spotweld. Only the area within the inner boundary of the Alclad inclusion is reliably bonded cast alloy nugget material

Fig. 7—Radiograph and faying plane of a spotweld with a misshapen nugget. Dark line on the radiograph follows faithfully the outline of the weld nugget. Improper sheet surface preparation or poor electrode tip conditions may cause misshapen weld nuggets

Interpreting Spotweld Radiographs

Rapid and reliable inspection of spotwelds for strength and quality are readily conducted with recently developed radiographic techniques. Interpretation charts are presented as a guide for industrial use

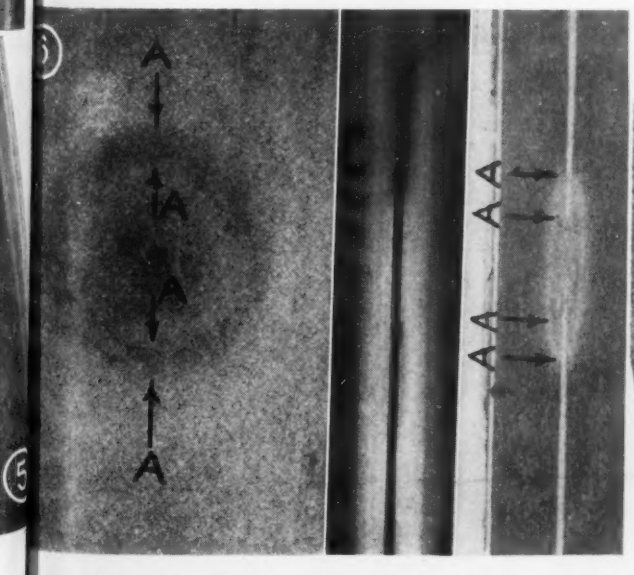
By ROBERT C. McMASTER
Assistant Research Supervisor
Battelle Memorial Institute
Columbus, O.

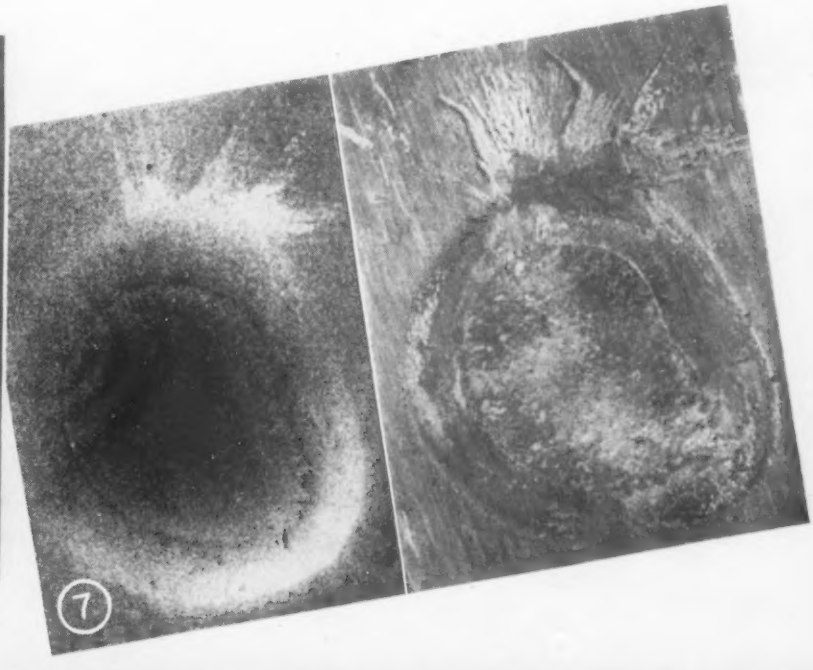
RESEARCH during the war period has led to the development of new radiographic techniques and methods of determining spotweld strength and quality from x-ray images. Rapid, reliable, nondestructive spotweld inspection can be carried out either directly after the weld is made, or at any later point in the fabrication process.

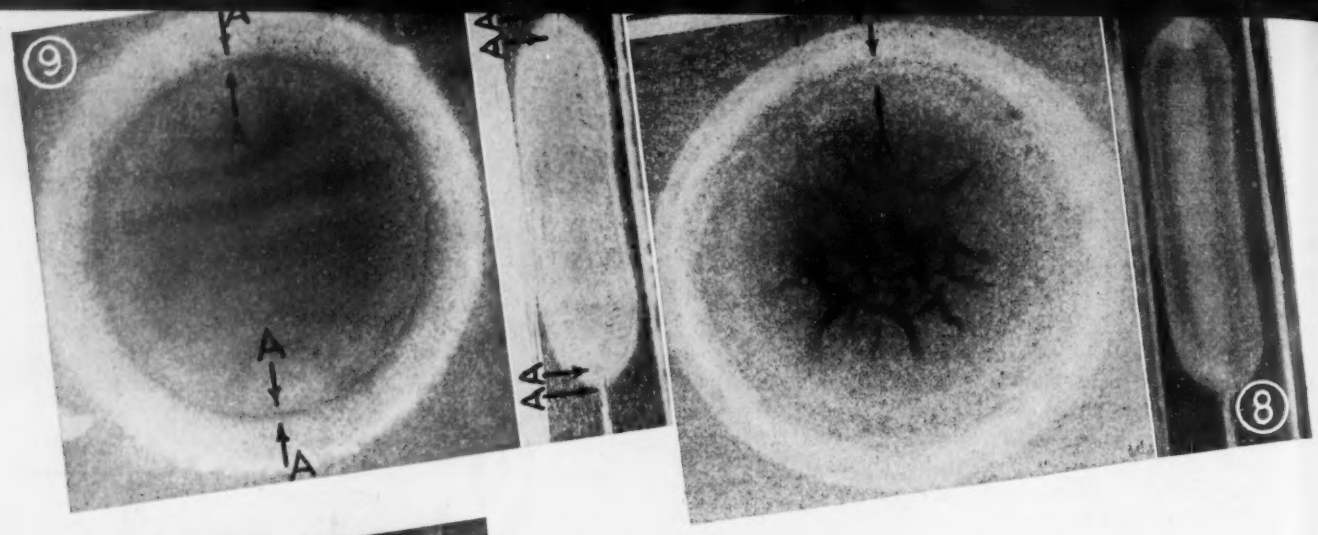
Alclad 24S-T and 75S-T aluminum alloys are ideal from the standpoint of spotweld radiography. Radiographs of spotwelds in these alloys reveal clearly the weld structure, strength, and quality. The following interpretation charts summarize the most significant indications to be obtained from such radiographs. They are organized for direct use in examining spotweld radiographs in industry.

Radiographic images of spotwelds are produced with exposure times as short as two seconds, by irradiating the welded sheets with a practically uniform field of high-intensity, low-voltage x-rays from a source with low inherent filtration. The x-ray image of the spotweld is produced because the x-rays are not absorbed uniformly throughout the entire exposure area. Differential x-ray absorption between adjacent areas of the spotwelded sheet material occurs for three basic reasons. These factors which produce the spotweld images are: (1) Variations in the total thickness of the sheet material, (2) variations in material composition and structure, and (3) variations in the geometry of inhomogeneous layers such as cladding or sheet materials.

Spotweld radiography provides a sensitive nondestructive test of nugget size and weld strength in materials with relatively large amounts (2 to 8 per cent) of alloying constituents whose radiographic densities differ from that of the major constituent. The presence of cladding layers with radiographic absorption widely different from that of the core material contributes to the clarity of radiographic images of weld nuggets. The combination of these features makes a sheet material ideal for spotweld radiography, and permits reliable radiographic inspection of spotwelds. Without these conditions, the weld nugget may not be revealed clearly on the spotweld radiograph. However, the spotweld radiograph reveals defects such as nugget cracking and porosity, extrusion or expulsion at the faying plane, and tip pick-up for spotwelds in any sheet material, regardless of composition or structure. Since the latter defects commonly result from poor process control, improper sheet preparation, or incorrect operation of the welding machine, radiography can always be used with benefits in spotweld quality control.







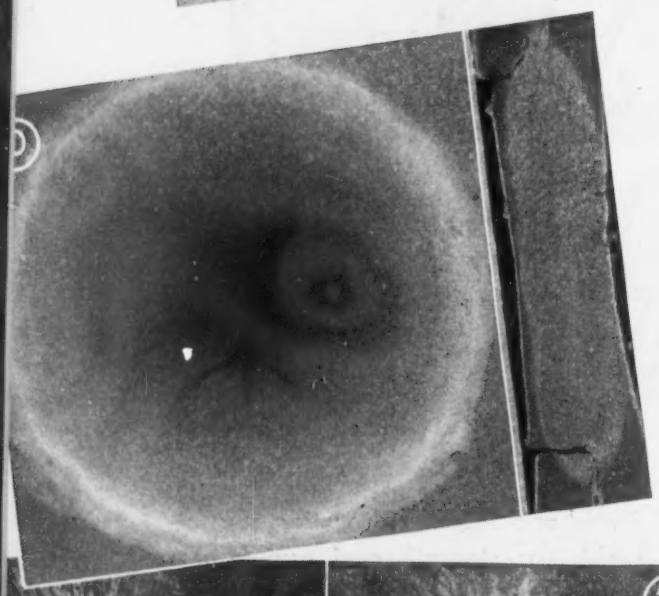


Fig. 8—Radiograph and section of spotweld in whose radiograph the prominent dark ring A-A splits into two concentric dark rings. This occurs when the nugget has somewhat different diameter or shape in the upper and lower spotwelded sheets, i.e., is unsymmetrical about the faying plane

Fig. 9—Radiograph and section of spotweld with large nugget diameter. The dark ring A-A is of corresponding diameter. The static shear strength will be greater than normal. However, strength consistency may be less than optimum, and small variations in welding-machine performance may introduce serious defects such as severe nugget cracking and porosity, extrusion, and expulsion. Usually, with some oversize welds, the heat-affected zone in parent material becomes excessive, and tip sticking may occur when the nugget penetration is excessive

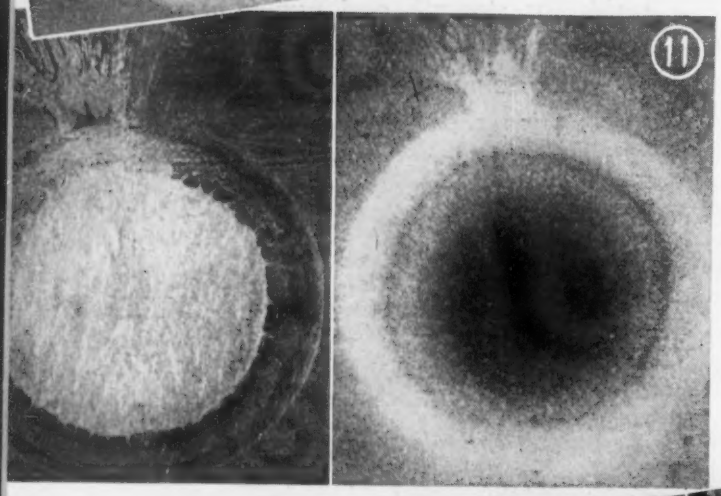
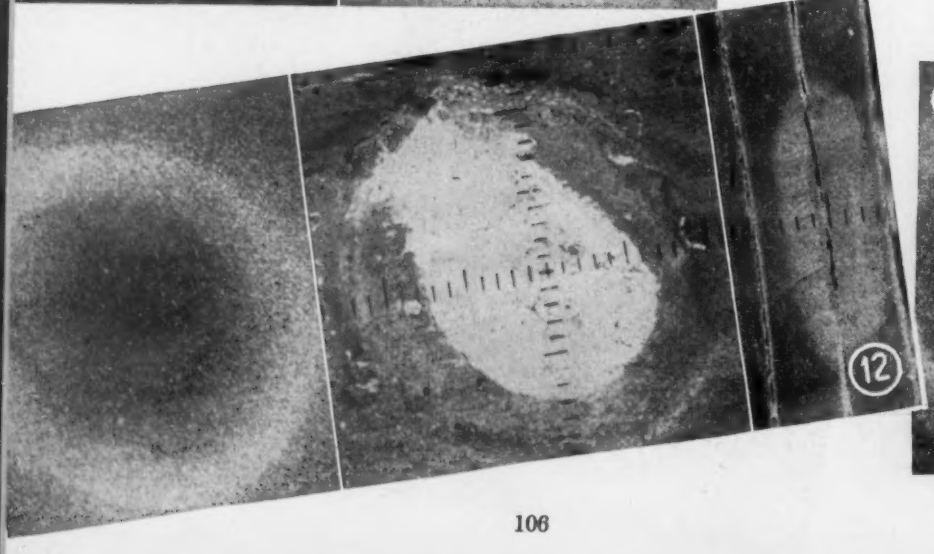


Fig. 10—Radiograph and section of large spotweld which has been subject to extrusion of the nugget at the faying plane. Dark ring may be broad and very faint because the Alclad inclusion is completely absent and the outer boundary between the nugget and the parent material has very little slope. The radiograph shows an exact image of the extruded material. Extrusion usually causes excessive sheet separation and may introduce the possibility of corrosion at the interface

Fig. 11—Radiograph and faying plane of a spotweld with a small expulsion ("spit") at the faying plane. Inadequate electrode pressure during welding, or small radius tips, may cause such expulsions

Fig. 12—Radiograph and faying plane of a spotweld with partial expulsion at the interface, often a result of tip skid



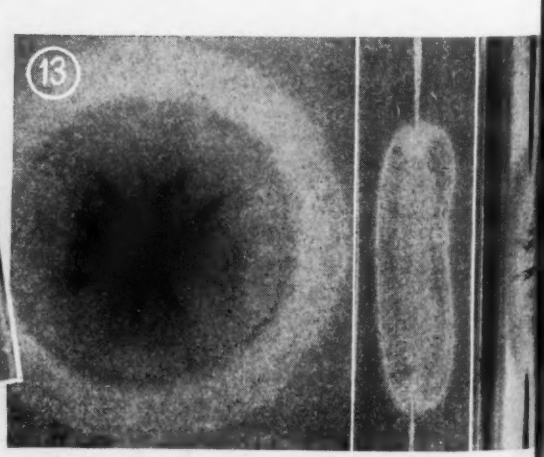


Fig. 13—Radiograph, section, and section radiograph, respectively, of a spotweld with fine cracks near the faying plane in the center of the nugget. The cracks shown clearly on the radiograph are usually difficult to observe on the weld-section macrograph. Such cracks may result from inadequate forge force or improper forge delay timing

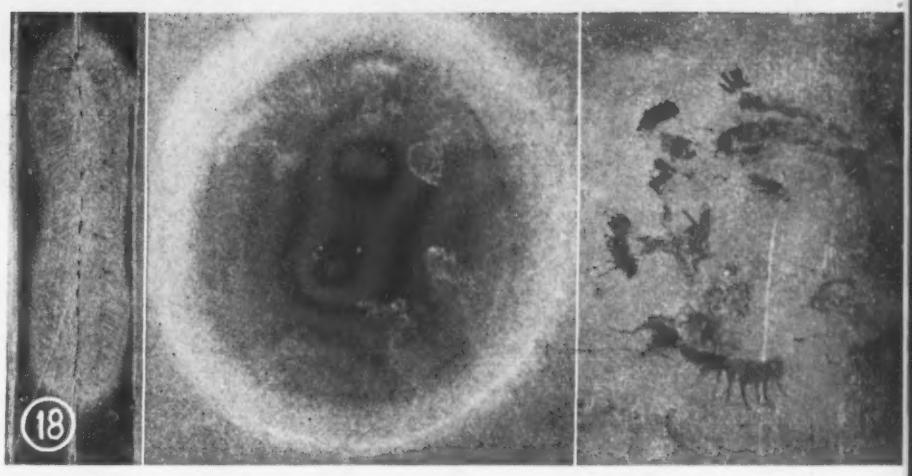
Fig. 14—Radiograph and section of a spotweld with small porosity indications. Porosity is indicated by small, dull (rounded) black images. These voids are visible in the section macrograph. Size and number of porosity indications, and their location with respect to the highly stressed regions of the weld nugget, determine their importance as structural defects. Porosity is often associated with cracking and extrusion or expulsion of the weld nugget

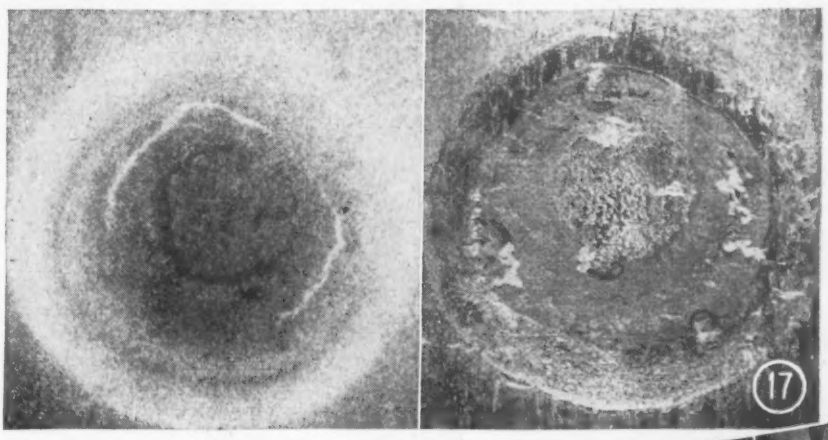
Fig. 15—Radiograph, section, and section radiograph, respectively, of a spotweld with segregation of eutectic in the parent material. Radiograph shows the location and extent of the eutectic segregation (associated with welding heat) by white ring C-C

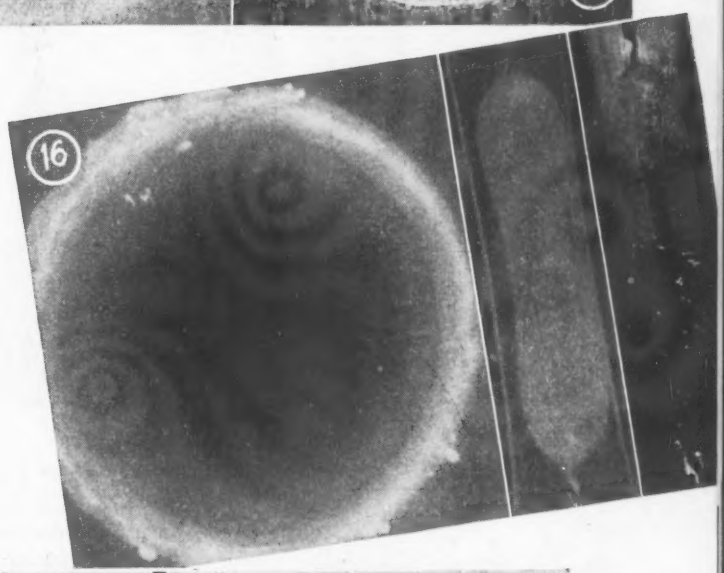
Fig. 16—Radiograph, section, and section radiograph, respectively, of a spotweld showing radial segregation of copper-rich constituents in the nugget (by faint, white, radial streaks just inside the dark ring). Section radiograph reveals the segregation to be near the faying plane. Cracking often occurs simultaneously

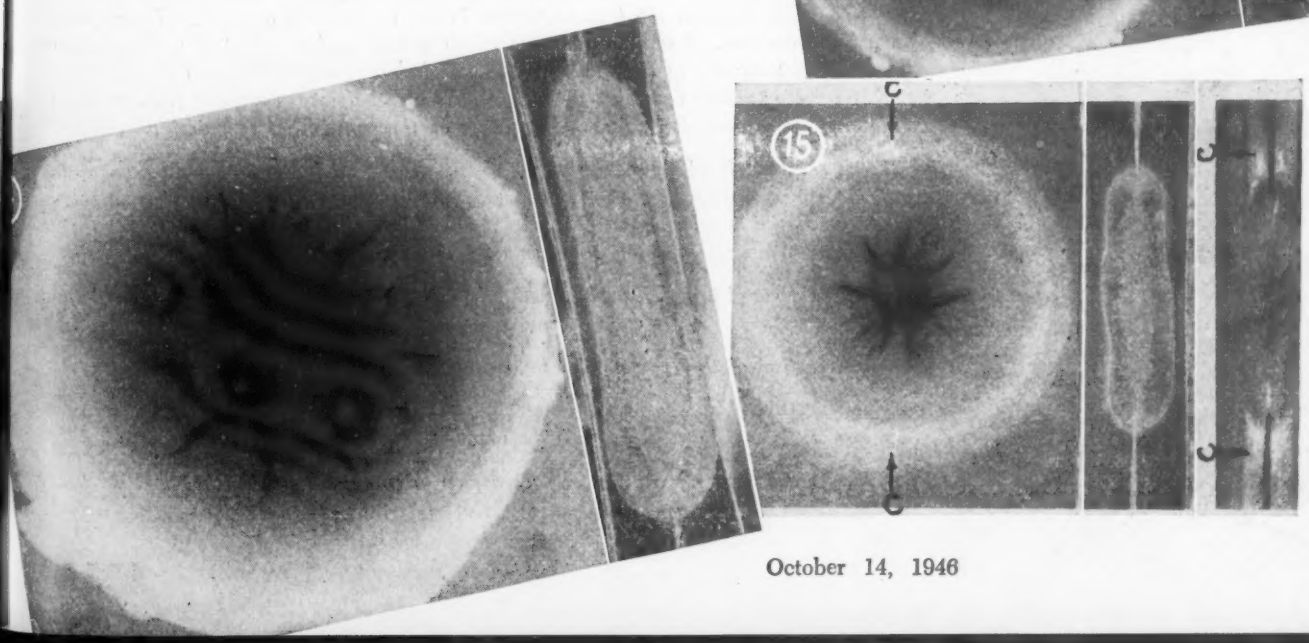
Fig. 17—Radiograph and faying surface of a doughnut-shaped spotweld nugget showing circular segregation of copper-rich constituents in the nugget. Faying surface shows corresponding patterns locating the segregation near the faying plane. Inner and outer boundaries of the weld nugget are shown by radiographic dark rings

Fig. 18—Section radiograph, radiograph and outer sheet surface macrograph, respectively, showing effects of tip pick-up. Etch and enlarged macrographs reveal that the copper alloy of the welding electrode tip alloyed with the material of the welded sheet. The radiograph reveals the pattern of deposited copper by the white images

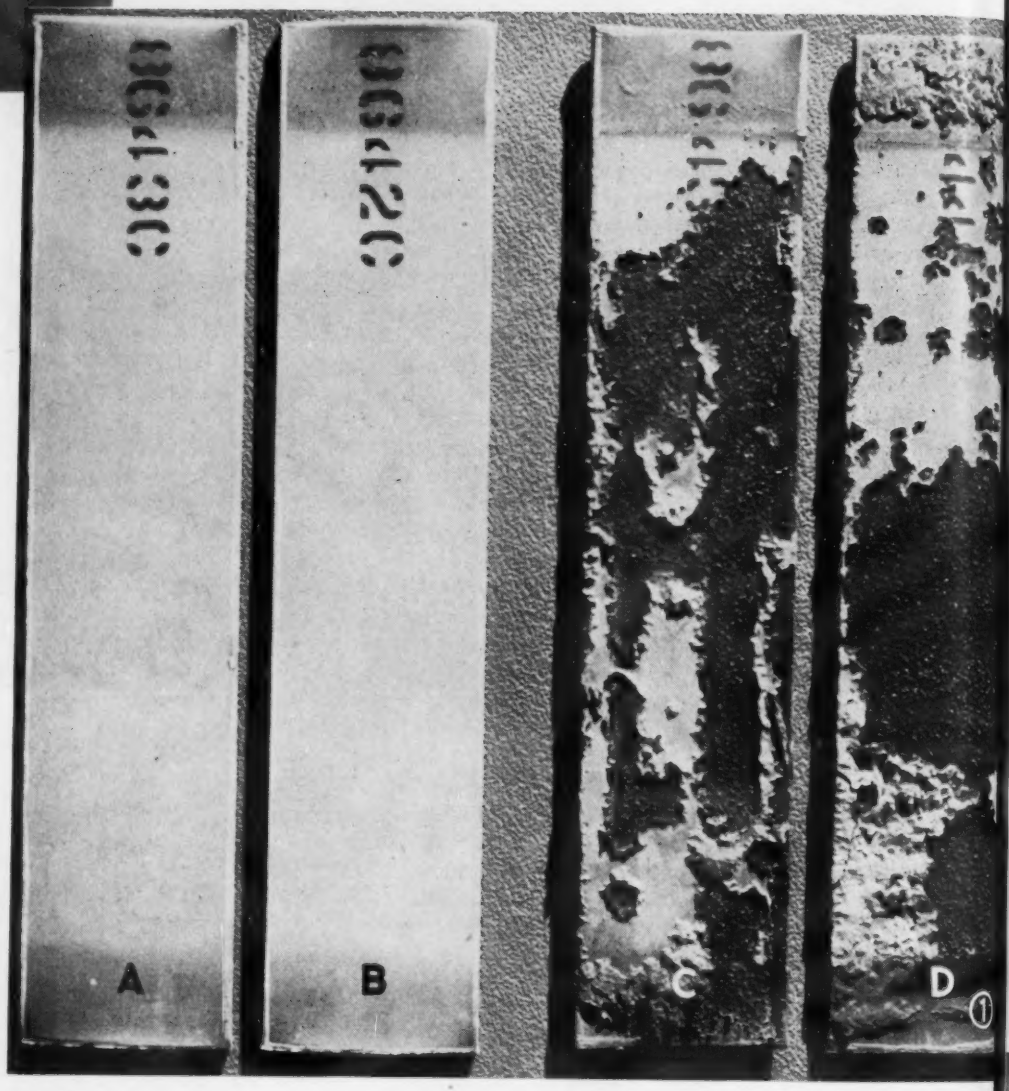


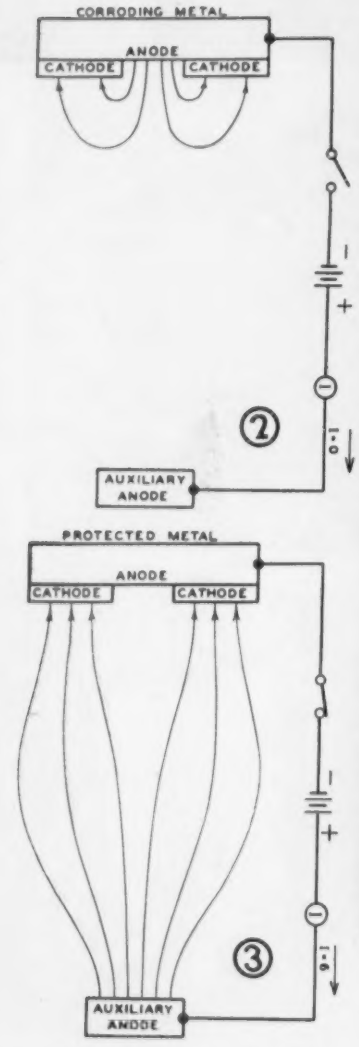


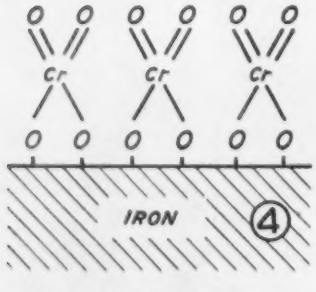




Modern Metal P







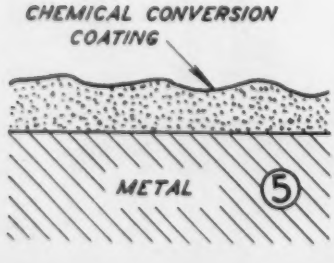


Fig. 1—Panels c and d were exposed to weather 3 weeks, then wire brushed to remove loose scale prior to painting. Panels a and b were painted before exposure to weather. All four panels were painted with one coat of synthetic zinc chromate primer and one coat of synthetic paint and then exposed 22 months at the Sherwin-Williams laboratory in Chicago. Panels a and b were found to be in excellent condition whereas panels c and d were complete failures due to the effect of corrosion products remaining on the surface before painting

Fig. 2—Sketch showing local action currents (positive current leaving an anode area of the surface and entering the cathode areas, represented, for example, by mill scale on iron) set up by various areas of the metal surface when the metal is immersed in an electrolyte. Cathodic protection current not flowing

Fig. 3—Sketch of a metal in an electrolyte cathodically protected using an auxiliary anode and external source of current

Fig. 4—Representation of the type of film formed when iron is passivated by chromates

Fig. 5—Representation of a corrosion product layer that is physically protective to the underlying metal

Fig. 6—Flaking equipment for caustic fabricated from a combination of nickel clad steel and nickel cast iron. Photo courtesy Colonial Iron Works, Cleveland

By ALLEN G. GRAY
Consulting Editor, STEEL

PROTECTION

A CORROSION AND COATINGS SYMPOSIUM—It has taken years to demonstrate that service conditions are the primary factors in the corrosion resistance of the commercial forms of iron and steel. With the development of corrosion study both from the standpoint of theory and practice, it has become evident that each specific corrosion problem is one of determining what factors in a given service are responsible for the corrosion and then either neutralizing these factors or finding a metal, alloy, or protective coating that is resistant to such factors. The relative merits of various protective coatings and finishes are being pondered by engineers and production men now planning the design of many new metal products.

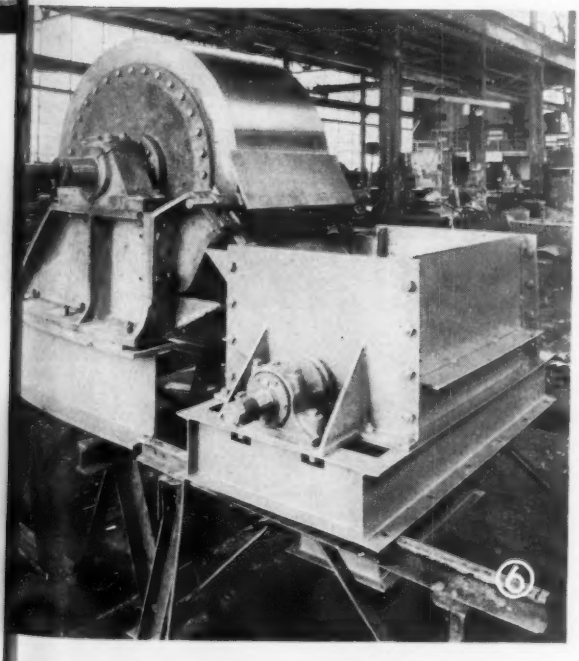
An increasing number of companies now have corrosion engineers. A few have well organized staffs engaged in corrosion testing. Extensive co-operative test installations which utilize actual service conditions under as close control as possible are adding tremendously to the knowledge of the behavior of metals and alloys, metallic and organic coatings, and paints under conditions of daily service. A basis for comparison of various methods of metal protection is provided by these data which have been assembled from papers presented by six authorities before a joint symposium organized by the Cleveland sections of the Electrochemical Society, American Chemical Society, and American Institute of Chemical Engineers.

FACTORS IN CORROSION CONTROL

From Paper by H. H. UHLIG,
Massachusetts Institute of Technology,
Cambridge, Mass.

ALL of the common metals tend to revert to their ores or to compounds of lower free energy. This tendency is more marked in some metals than in others, but since time to failure of metal structures or the amount of metal ion contaminating the environment is the main concern, emphasis in the field of corrosion is on rate of metal attack rather than on tendency.

The corrosion rate of a metal is controlled in several different ways. In brief, these involve application of (1) cathodic protection, (2) metallic coatings, (3) inorganic and organic coatings, (4) adsorbed and reaction product films, that is, passivators and inhibitors, (5) alteration of the environment such as oxygen removal, (6) metal purification, (7) alloying.



Cathodic Protection: Cathodic protection is the one method known for preventing corrosion or for reducing the corrosion rate virtually to zero. This method is widely used to protect many miles of buried iron pipe, and is now receiving greater attention in the protection of hot and cold water tanks. A buried pipe line or water tank so protected has unlimited life. The principle of its application involves neutralization of the electric currents that account for the observed corrosion and that operate between the multitudious anodes and cathodes of the metal surface. Protection is accomplished by using an external anode and connecting it to the positive terminal of a rectifier or other source of dc current, and the structure to be protected to the negative terminal.

Fig. 2 shows a sketch of a metal immersed in an electrolyte showing positive current leaving an anode area of the surface and entering the cathode areas, represented, for example, by mill scale on iron. These local action currents account for solution of the metal at the anode. In Fig. 3, the switch is closed, providing for current from an external source that enters the metal in opposite direction to the flow of currents from anode and neutralizes such currents. Corrosion, thereafter, can not occur so long as the external circuit is closed and provided sufficient external current flows to overcome the local action currents. Cathodic protection in this manner is also accomplished using a sacrificial anode of zinc or magnesium.

Metallic Coatings: The principle of cathode protection appears in the use of zinc coated iron. The current flows in such a way that iron is cathodically protected at the expense of corroding zinc, and thus no rusting of the iron occurs until practically all the zinc in the neighborhood has first corroded. The effective area of iron protected by the remaining zinc increases with the conductivity of the solution causing the corrosion. In some drinking waters, iron rusts at a break in the zinc coating within only 1/8 or 1/4-in. from the zinc, but in higher conductivity waters, such as sea water, the iron is continuously protected at least several inches removed from the zinc coating. There is also evidence that in hot fresh waters, the zinc coating is either less protective or reverses its polarity with respect to iron. (*Please turn to Page* 144)

Removing dissolved g

Five types of flushing gas employed for producing artificial boil of molten metal are described in this concluding installment. Gas ejected below surface of metal through bare iron pipe or modified ladle stopper rod assemblies

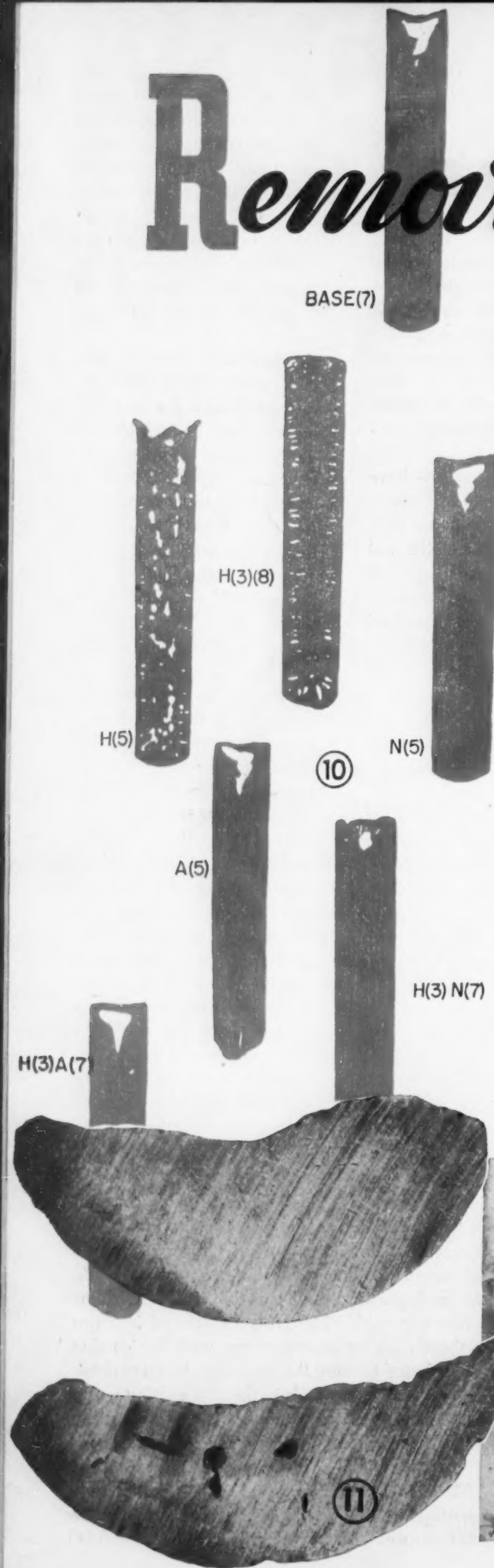
ONE of the most flexible, simple, and economical methods available for the removal of dissolved gas in molten metals is the flushing process[6, 7]. In simple terms, flushing is nothing but bubbling an inert gas through molten metal—an artificial boil. While the effects of bubbling inert gas on the removal of dissolved gases has been known for some time, only recent developments in producing hydrogen free inert gases have made this process generally available.

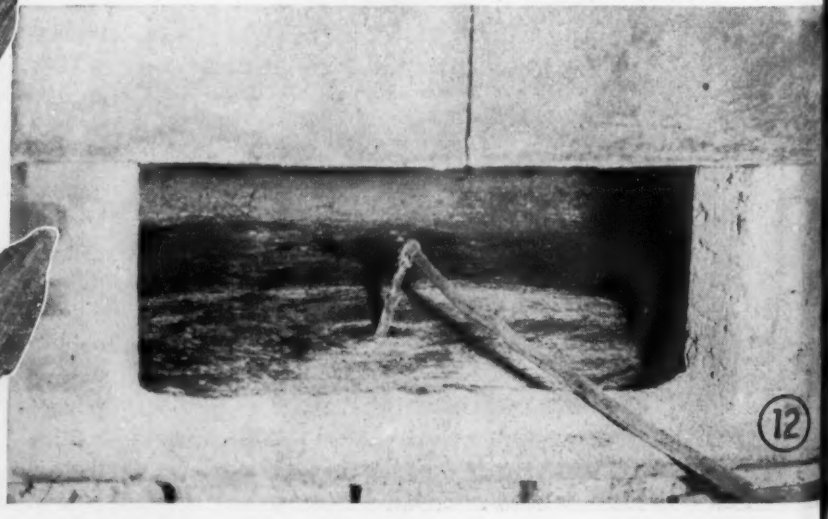
Flushing action of an inert gas is purely physical[8], and depends on differences of partial pressure and diffusion. A bubble of flushing gas, rising through the molten metal, starts out free of hydrogen. In the melt there is an appreciable pressure of dissolved gas, when the melt is flushed, this hydrogen diffuses through the inert gas-metal interface until the partial pressure of the hydrogen in the rising bubble is in equilibrium with the pressure of hydrogen in the melt. The bubble rises rapidly carrying some of the dissolved gas with it, and both are discharged into the atmosphere above the molten metal.

Geller[9] has derived the basic relation whereby the quantity of flushing gas required to reduce the dissolved gas to a predetermined minimum may be calculated. The basic equation for a flushing gas of infinitesimal bubble size is shown in the following equation:

$$S = \frac{224}{M_L}\left[\frac{P}{K_2}\left(\frac{1}{L} = \frac{1}{L_a}\right) + L - L_a\right]$$

(6) All reference are presented at the end of this installment.





By P. M. HULME
Metallurgical Engineer
Air Reduction Sales Co.
New York

gases FROM MOLTEN METALS

S is liters of flushing gas per kg of metal.
M_L is molecular weight of gas L in the gaseous phase.
P is the total pressure of the gas in the metal expressed in atmospheres.
K_2 is a constant depending upon the square of the content of dissolved gas.
L_a is the content of dissolved gas at start of flushing in per cent by weight.
L is the gas content of the metal in per cent by weight after S liters of gas have been flushed through the metal. Since both L and L_a are small in all cases, for practical purposes, the last two terms in the bracket can be disregarded.

Fig. 10—Swinden-Stevenson series of steel ingots showing effect of treatment with various gases

Fig. 11—Samples of high-nickel alloy taken from casting ladle before treatment with nitrogen and after flushing 1 min with nitrogen

Fig. 12—Closeup of flushing process in aluminum furnace showing absence of violent action

Fig. 13—Sample of two stainless steel ingots showing effect of flushing molten metal with argon before casting. Top ingot was taken before flushing, the bottom after 4 min treatment. Apparent depression in porous ingot is a rim rather than a true shrink

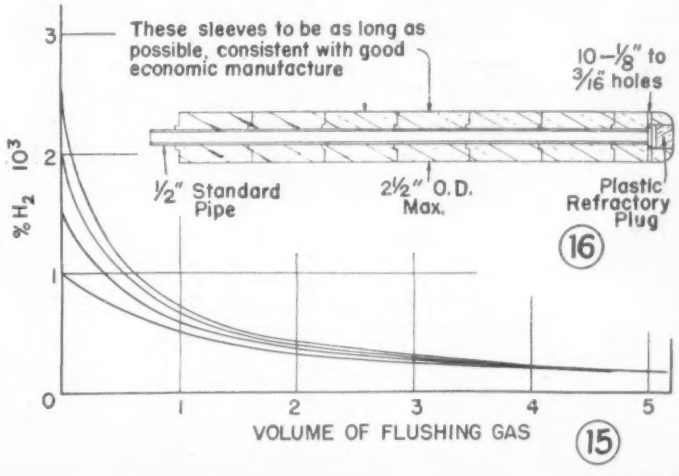
Fig. 14—Flushing aluminum to prevent formation of pinhole porosity. Carbon tube injecting dry nitrogen into molten aluminum held in 500-lb pot

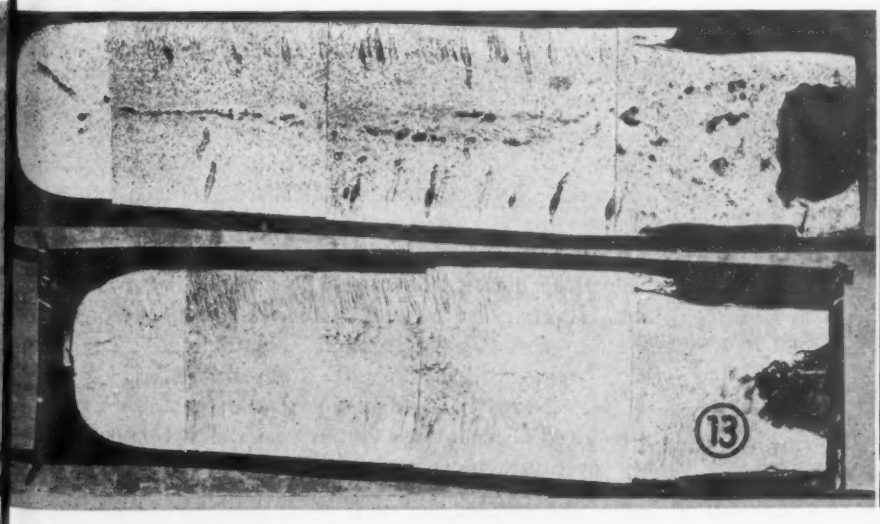
Fig. 15—Rate of degassing calculated from the Geller equation

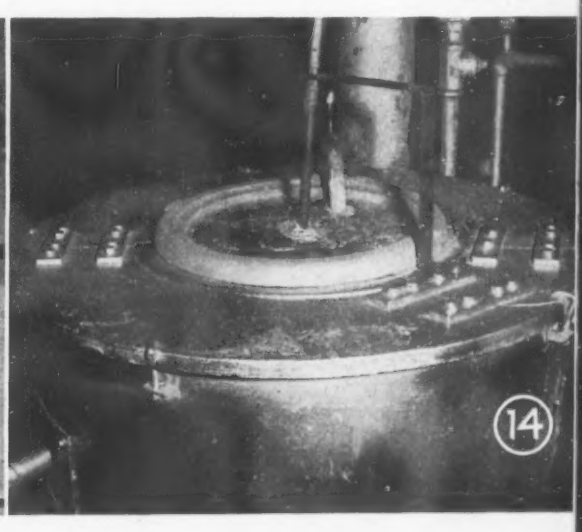
Fig. 16—Injection device for flushing stainless steel

Complete quantitative data for calculating K_2 are not available under commercial conditions, since $K_2 = P_L \div L_a 2$, where P_L is the pressure of the dissolved gas in equilibrium at a stated temperature, and L_a is the per cent, by weight, of the gas dissolved at the stated temperature. Geller assumed that P_L was equivalent to the total static head of molten metal, but subsequent calculation based on available data shows this value to be too high. However, by assuming L_a for hydrogen in steel at 1600° C to be 0.0028 per cent, the characteristic curves for volume of flushing gas versus the final hydrogen content of the metal can be calculated and plotted. Fig. 15 shows four such curves based on original hydrogen content of 0.0025, 0.002, 0.0015 and 0.001 per cent by weight of the molten metal.

From these curves and from the theory of the mechanism of the flushing process, it is evident that the initial content of dissolved gas is not an important factor in determining the total amount of flushing gas to use. Consequently, even with a "wild" heat of steel, an amount of flushing gas equal to point No. 1 on the curve will quickly remove considerable quantities of dissolved gas. The curves also demonstrate that it is difficult to remove the last traces of hydrogen. But in practice it has been found that 4 cu ft of inert gas per ton of metal will make a "wild" heat of steel relatively gas free, so that the final castings are sound. Moreover, this flushing is done with open end pipes so that the bubble size is probably 1 in. diameter rather than infinitesimal. (*Please turn to Page* 122)







Machining Stainless S

Stoned cutting edges and the right lubricants mean better finishes and longer tool life, heavier cuts and higher speeds. These subjects, as well as broaching, are covered in the concluding article of this series

TABLE XIII—BROACHING SPEEDS

Type No.	Cutting Speed Feet per Minute (Low and High)	Approximate cut per tooth Rd. Broaches	Nearest Comparable Equivalent in Ordinary Steels
410	10/20	0.001/0.005-in.	SAE-3140, 4140, 6140, etc.
420	8/15	0.001/0.005-in.	SAE-1095, 3150, 3312, 6150
420F	10/20	0.001/0.005-in.	SAE-2315, 2340, 2345
440	8/12	0.001/0.005-in.	High Speed Tool Steel
440F	8/15	0.001/0.005-in.	SAE-1060, 1070, 1095
443	10/20	0.001/0.005-in.	SAE-3145, 3250, 4650, 6150, etc.
302	8/15	0.001/0.005-in.	Copper-nickel alloys—except that 302 work-hardens
416	15/25	0.001/0.005-in.	SAE-1030, 1120, X1340
430	10/20	0.001/0.005-in.	SAE-3140, 4140, 6140, etc.
430F	15/25	0.001/0.005-in.	SAE-1030, 1120, X1340
329	8/12	0.001/0.005-in.	Copper-nickel alloys
303	10/20	0.001/0.005-in.	SAE-8120, 3145, 4615

NOTE: Figures shown above are average. On some jobs it may be possible to use even higher speeds. However, on certain work, nature of the part may require slower speeds than are recommended here. All recommendations are based on the use of standard high speed tools.

TABLE XIV—BROACHING CHECK CHART

Trouble	Correction
Broken teeth.	Packing of chips due to improper grinding (see Fig. 14) may be one cause for broken teeth. Chip packing on Stainless can occur where a continuous chip is being made and the proper clearance has not been provided for. On surface broaching a large error in alignment can throw too heavy a load on teeth, causing breakage. Always check the holder first for straight travel before a part is actually broached. When placing broach inserts in holder, be sure everything is clean and free from grit or chips. Foreign matter can force inserts out of line. Check steps of inserts with dial indicator. A small difference in their height may tear teeth.
Spoiled work or broken insert on surface broach.	Check insert assembly in holder to see if screws are too long or too short. If the insert is loose, the screws are too long and a loose insert will not cut accurately. This is also cause of some insert breakage. If screws are too short and are pulled up with force, the screw hole becomes weak and eventually pulls out. Be sure the screws are the right length and then tighten them without excessive force.
Insert breaks in assembly.	This is usually due to "poor housekeeping". You may have assembled it with a chip or some other foreign matter between insert and holder and the force of tightening screws broke it. All broach inserts are made of fully hardened high speed steel, which contributes further to easy breakage.
Poor finish and variation in size on broached surface.	Look for loose clamps. Check loading fixture and seating of pieces. Improper loading and chip accumulation are causes.
Breakage of internal broach.	Check alignment. See that direction of pull is at right angles to face plate. Check center axis of broach with axis of face plate as these must be in line. This is very important where part is held in a cup in the face plate. If a "follow rest" is used, this also must be in perfect alignment with pullhead and face plate.
Drifting.	Check the center of the starting hole. It probably is not centralized with broach center.
Round or spline broaches cut off center.	This is caused by "drifting". On round holes one side does not clean up. On spline broaches the splines will be eccentric. See above recommendation to eliminate drifting.
Excessive wear and dulling of teeth.	Again this is usually the result of "drifting". Also check lubricant. If too rich in sulphur, cut back with paraffin base oil.
Chatter.	Inserts may have feather edge and require stoning. Parts not held tight enough. Part vibrates from forcing the cut. Chatter can also develop from using too light a machine. Check hydraulic system.
Parts will not hold size.	Look for something loose while broach is cutting. Part may be "springing" due to cutting force. Check clamps. Are they strong enough? Check for deflection in machine.
Tearing and/or heavy burrs.	Dead soft steel is draggy and can be the cause of this condition.

BROACHING offers a means for rapid removal of metal either externally or internally—and produces a finished job to close precision limits. There is only one limitation to broaching, and that is that there must not be any interference with the movement or passage of the broach. Generally, only broach manufacturers are equipped to make these tools, therefore, it is advisable to consult a good manufacturer about your job.

A broach is a simple tool for the operator to handle, because the broach manufacturer builds into it the necessary feed and depth of cut by steps from one tooth to another. Basically a broach will incorporate, in one tool, the roughing cut, the semifinished cut and the final precision cut. Some broaches are made with the addition of burnishing buttons where a burnished finish is required. The form or shape of a broach tooth is unlimited. Therefore, there is no limitation to the shape or contour of broached surfaces.

There are many broaching machines available, and they fall into two general classes—vertical and horizontal—either of which can be used for push or pull broaching. On internal broaching, a properly drilled or reamed hole is satisfactory. On external or surface broaching, preliminary machining operations are seldom required.

In designing the radius for the broach, the manufacturer provides maximum tooth strength and a "pocket" for chips. Broach manufacturers also correctly incorporate into the broach, depending on the job, such items as side relief (flat broaches), undercut and clearance (spline broaches) and chip breakers (to handle wide chips).

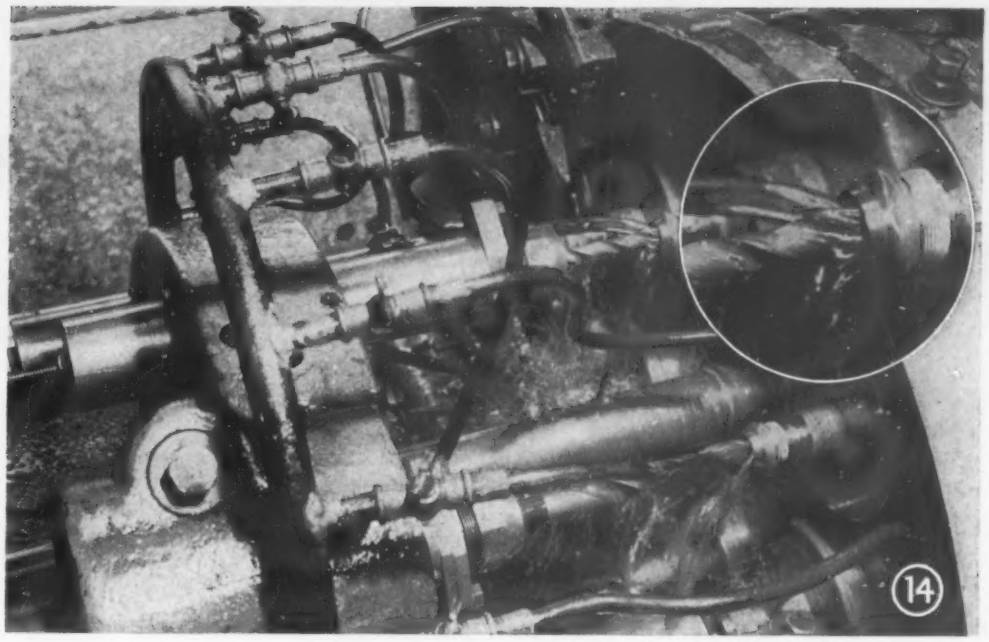
When a broach becomes dull, it should only be resharpened on a regular broach grinder in accordance with the recommendations shown in Fig. 17, or returned to the manufacturer to be reground. On internal broaches, the "back-off" angle should be held to a minimum, preferably a 2 degree angle and not to exceed 5 degrees. Too much "back-off" angle will shorten broach life due to size reduction from resharpening.

Any nicks on the cutting edges of the broach will score the surface of the work; careful handling is very important. If broaches are allowed to roll against each other or strike metal, the damage will undoubtedly be on a cutting edge, which may nick it beyond repair.

Most all broaches will handle stainless running as high as rockwell C 35. When cutting material at this hardness, it is necessary to reduce speed in feet per minute and to use a lubricant with very little thinning. (See Table

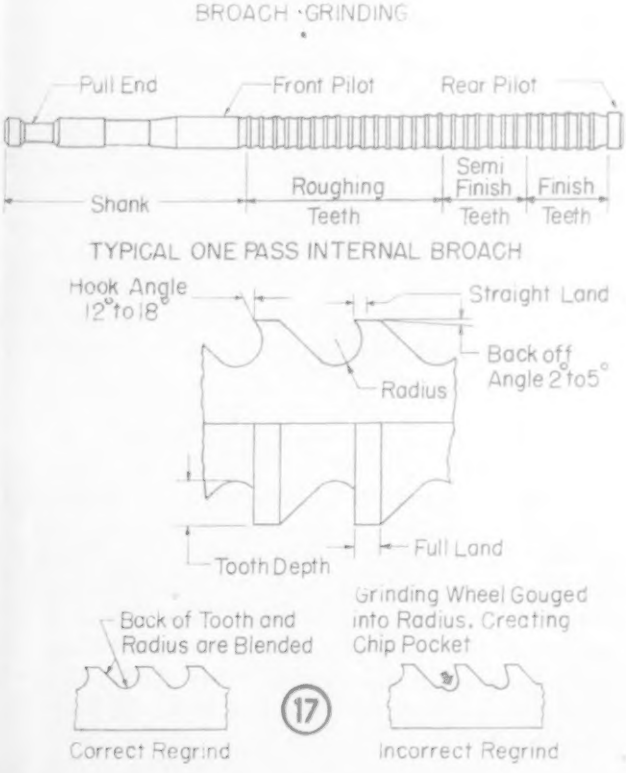
Steels

By E. VON HAMBACH
Research and Development Engineer
The Carpenter Steel Co.
Reading, Pa.



XIII for recommended speeds). Broaches have cut stock harder than rockwell C 35, but the cost is usually prohibitive because the broach dulls rapidly and not enough pieces are produced between grinds. Where higher hardnesses are required (above rockwell C 35) pieces are first broached, then heat treated. To remove any light scale and correct possible distortion resulting from heat treating, a special broach known as a hard gear broach can be used when machines with enough power are available.

Proper lubrication and cooling are important. Sulphur-chlorinated oils, cut with paraffin rather than with water-soluble oils, are desired when broaching stainless steels. Possible troubles and their corrections are given in Table XIV on opposite page. (*Please turn to Page* 134)



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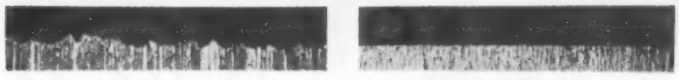

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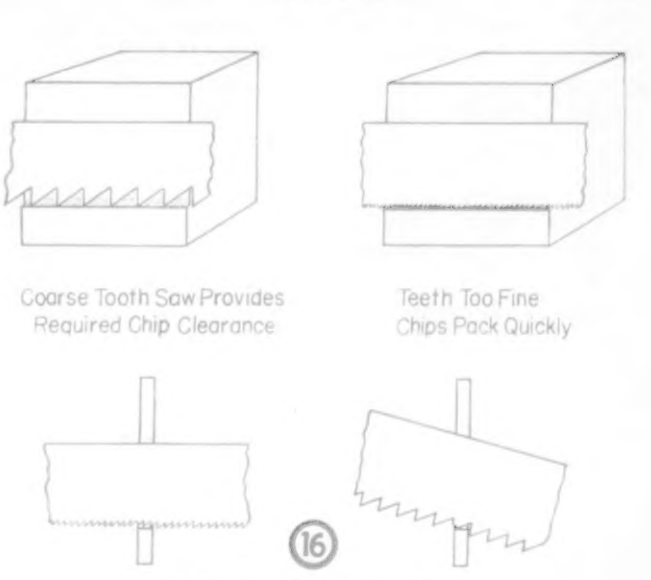

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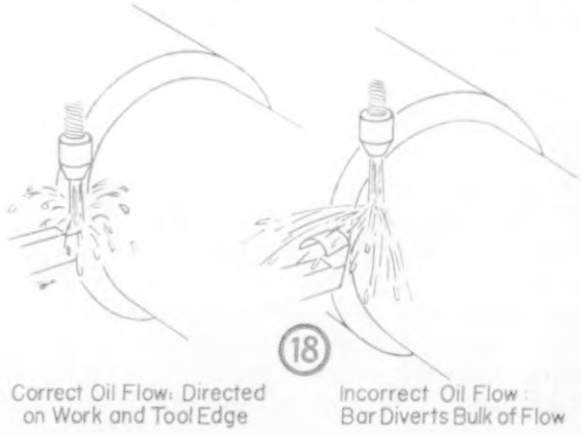
For Thin Gage Material or Tubing, Fine Tooth Saws Work Best


BE SURE OIL FLOW IS PROPERLY DIRECTED
Correct Oil Flow: Directed on Work and Tool Edge
Incorrect Oil Flow: Bar Diverts Bulk of Flow

18

Engineering News *at a Glance*

ONE of the largest single conveyor belts it has ever made is reported by B. F. Goodrich Co. of Akron. Measuring 5100 ft in length, the belt weighs 72,000 lb and is constructed in six sections. In order to shut down the conveyor system on which the belt will operate—for the shortest possible time—the six lengths were spliced together at the customer's plant. A special frame and wind-up was built at the point of installation so that in changing belts, the new one will be fastened to the end of the old, pulled over the pulleys and spliced endless on the job.

VOICE radio equipment for railroads which provide clear communication between trains on the same or adjacent tracks, between locomotive and caboose or between trains and wayside stations is being turned out by Westinghouse Electric Corp., Pittsburgh. According to the company, the transmitter of the equipment is frequency modulated, operating in the 152 to 162 megacycle band. Output frequency is obtained by use of frequency multipliers which follow a crystal-controlled oscillator. A tone generator for calling purposes and an automatic level control circuit prevents excessive audio input and distortion.

AN engineer in Russia recently devised a method of casting metal by "frosting" or crystallization, the Soviet press states. In the process the mold, the inside walls of which are cooled by circulating water, is immersed in molten metal and left until the outside walls are covered or frosted with an even layer of the desired thickness. Method was satisfactorily tried out in the manufacture of bronze bushings and experiments are being made with other metals. Articles cast in this manner are reported to be of high quality and have a smooth surface.

COUNTING rates as high as 12,000 per minute may be attained with a multiple counter apparatus now being manufactured by Potter Instrument Co. at Flushing, N. Y. Designed to serve as a centralized control over a number of independent machine processes, the apparatus consists of five dual electronic counters. It is being used effectively by slide fastener manufacturers as a production control over the fastener length and spacing.

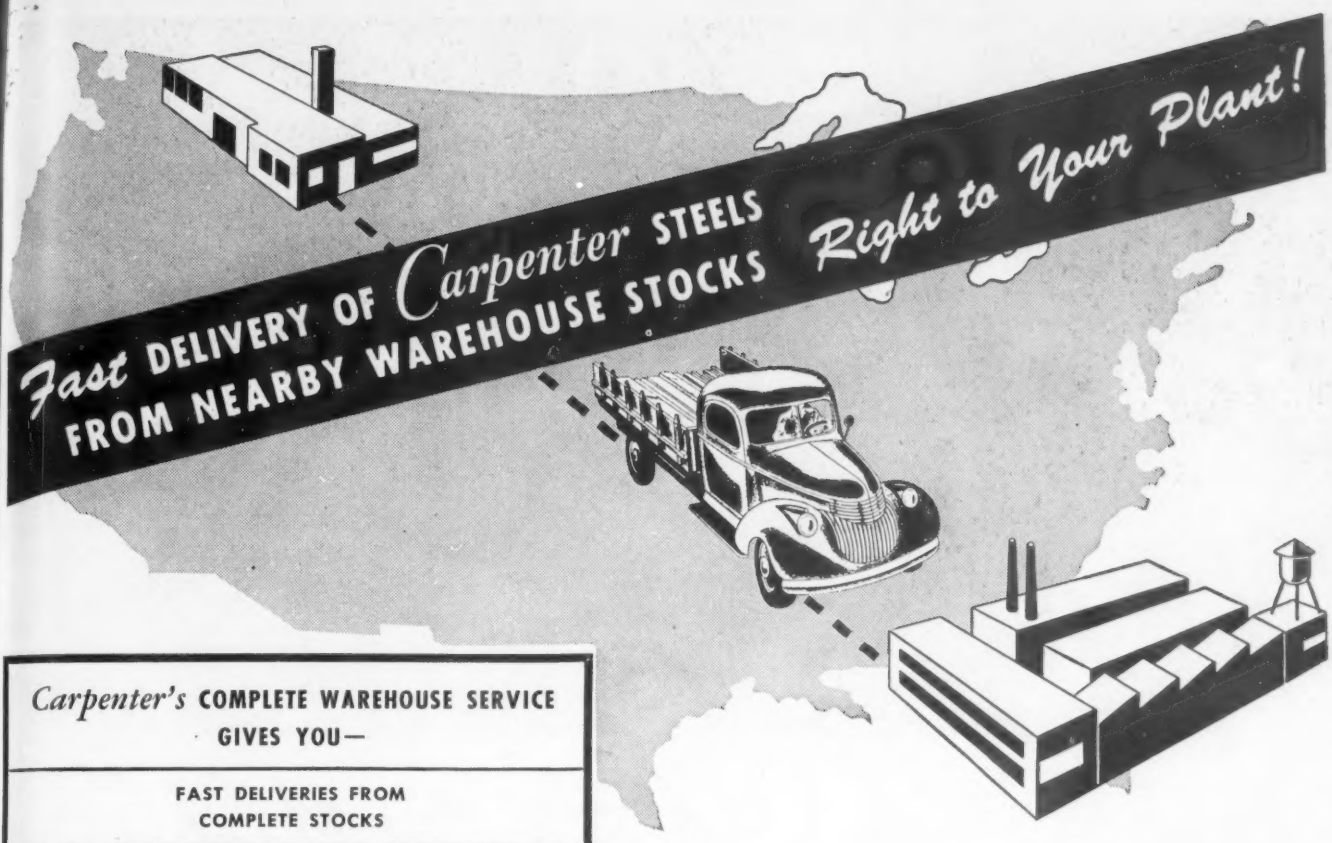
UNUSUAL method of making races for ball bearings on German machines operating on the principle of a tire-rolling machine is described in a report now available from the Department of Commerce, Washington. An advantage of the German process over the upset forging process —usually used for making races—is that it eliminates use of forging dies. Other advantages are: Two sizes of rolling machines produce a complete range of races, including those with outside dimensions up to 800 mm; smaller furnaces are used to heat blanks, as handling of heavy forgings is eliminated. Blanks of precise amount of metal for the rings are cut, heated and formed into rings by a triple ram press in the operation. These are then placed on a specially shaped, freely rotating spindle. Pressure of a driving wheel, which is applied to the outer surface of rings, rolls them to proper size and shape.

DOUBLE check provided by a General Electric thickness gage in the finishing operations of Florence Stove Co., Kankakee, Ill., is saving the company some $600 per month, the latter reports. Used to determine thickness, and degree of whiteness of porcelain enamel on stove parts, the gage not only speeds up production, but reduces number of rejected parts. The gage first is used to determine exact thickness of enamel that will give a desired shade of white, then after the part is sprayed, it again is checked by the gage before it is baked, to ascertain uniformity.

ONE of the most fascinating exhibits at the recent Swiss Industries fair at Basel, according to the "Foreign Commerce Weekly", was the Isophone. The instrument which attaches to a telephone circuit, acts as a robot secretary in the absence of the subscriber. By a complex electrical hookup engineered around a wire recorder, the device answers the telephone, takes messages and plays them back. Thus the caller, upon learning of the subscriber's absence, may dictate a message. The subscriber later may call his own number from a remote point and receive the message—without the possibility of it being distorted or garbled through human misinterpretations of the messages being received.

GRADUAL build-up on dies is reported eliminated when using a forging compound that leaves a protecting film of micro thickness on the dies. According to Brooks Oil Co., Cleveland, supplier of the compound, one user who forges railroad car wheels advises the compound prevented stickers in his plant. The product, which is offered in three grades, does not separate in storage or in use, and does not create heavy fire and dense smoke in forging operations.

SIGNIFICANT advance in tool and die engineering service was made recently by Bunell Machine & Tool Co., Cleveland, in offering an outside engineering service to analyze and review manufacturing processes to determine solution to individual problems. The service, offered in addition to the regular engineering and machine service provided in the company's plant, involves sending out trained engineers to make the necessary check of current procedures and machines, according to M. O. Shepherd, works manager.



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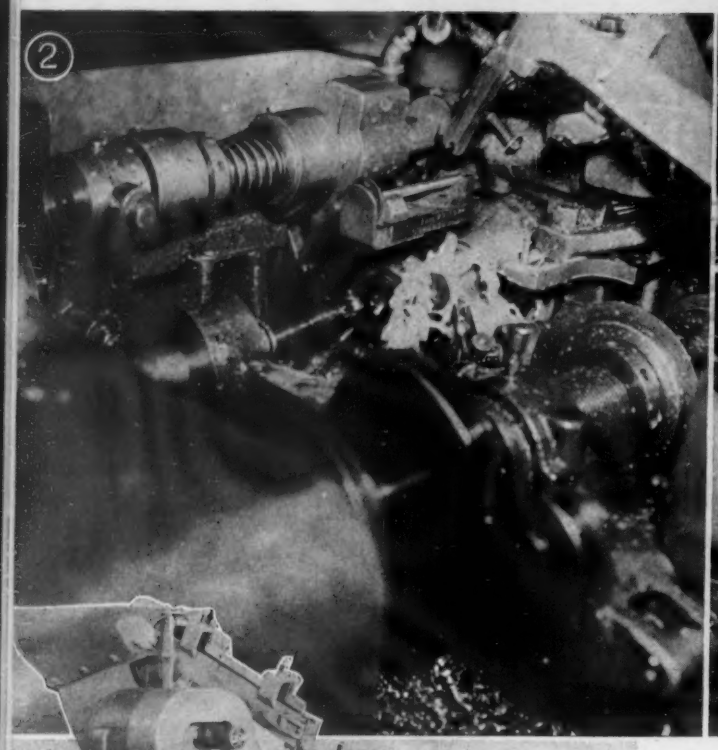
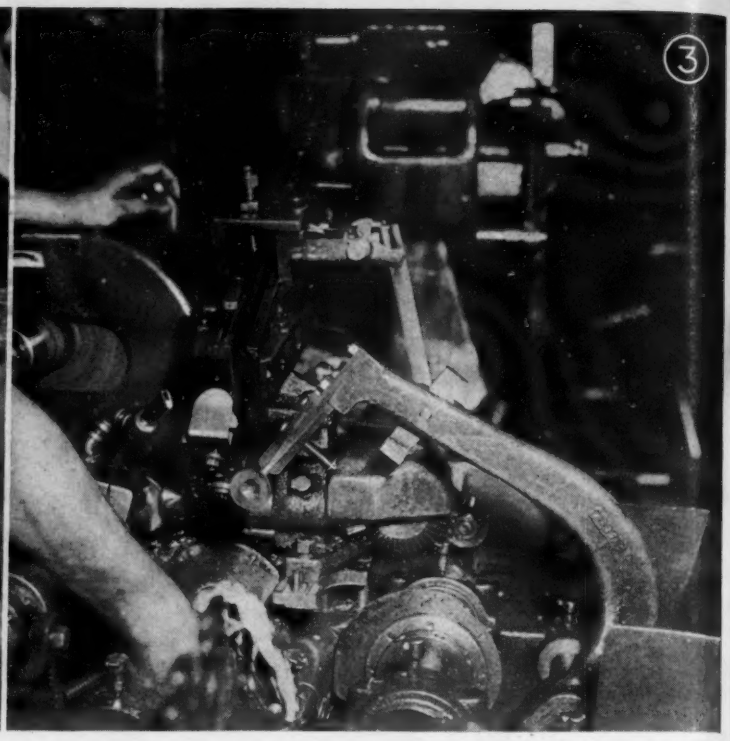
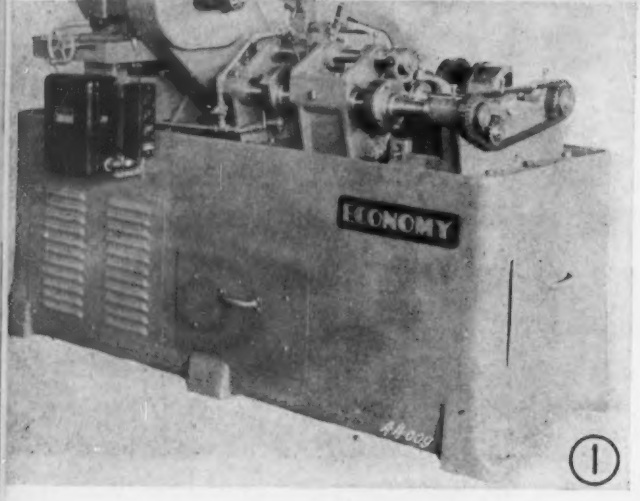






Automatic Machining

Of Automotive Valves

Machining of valves performed on automatic machine at rate of 400 to 500 per hour. Lone operator function is to load machine

Fig. 1—Overall view of Economy Type S-4300 1-in. automatic shaving machine from left side showing hopper and loading chute with valve about to be placed in the tilting cradle arm prior to being picked up by positioning arm

Fig. 2—Valve in horizontal position in the tilting cradle arm. Positioning arm is descending to pick it up for placing before chuck. Previously placed valve may be seen being machined, surrounded by coolant spray

Fig. 3 — Fingers on positioning arm have picked up valve and the tilting cradle arm is returning to end of loading chute to receive next valve, seen in chute behind feeding mechanism

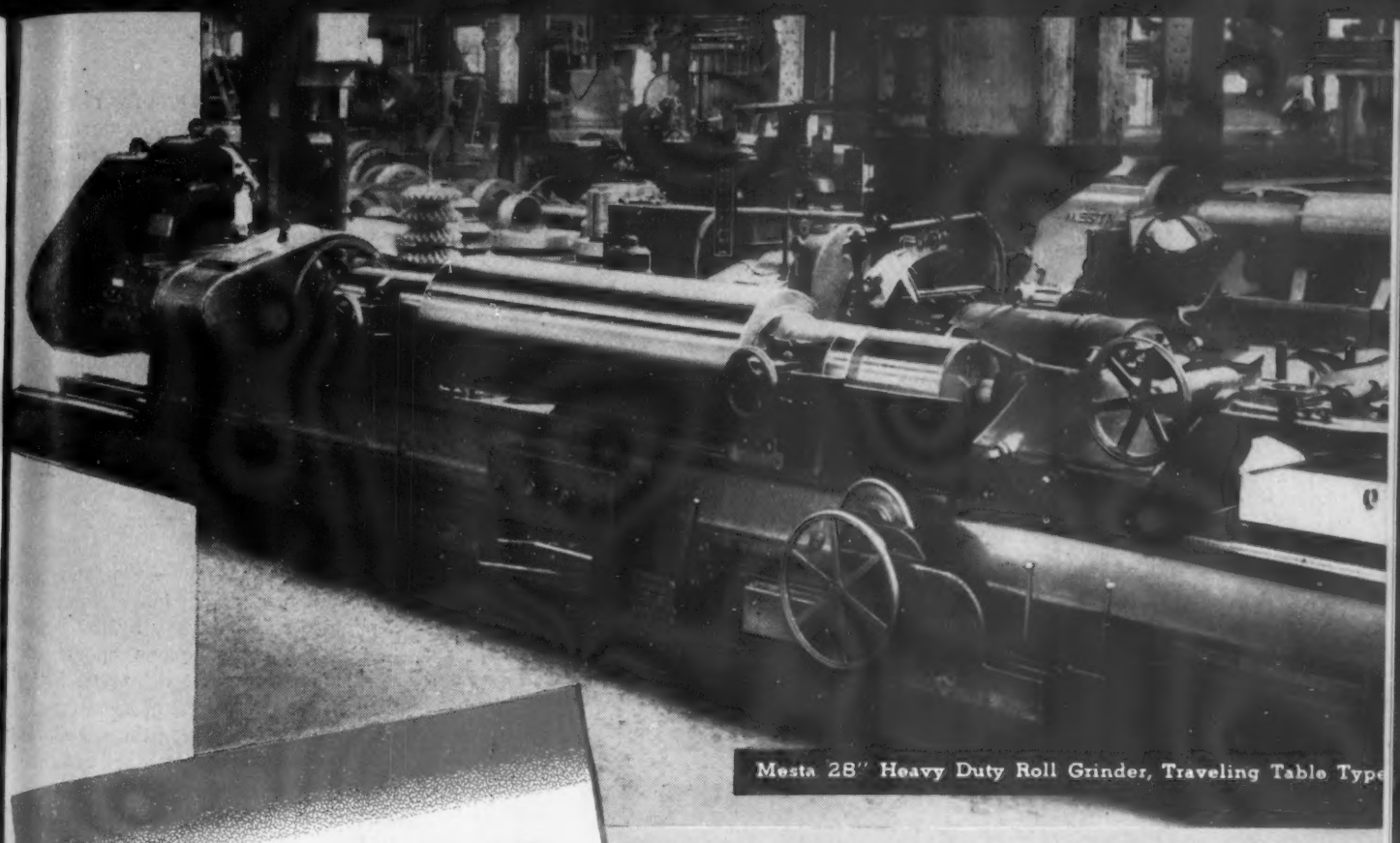
AN ability to perform several or multiple operations on automotive parts at a speed hitherto impossible with other equipment is a distinguishing feature of an automatic machine tool now at work in the valve department of Thompson Aircraft Products Co., Euclid, O. Each one of these machines—originally designed by the builder, Economy Engineering Co., Willoughby, O., for secondary operations on cold-headed automotive and aircraft parts—is currently producing from 400 to 500 valves per hour.

When the valves arrive at the machine, they have been trimmed to length after forging, then annealed and sand blasted. The stems have been roll straightened and centerless ground to provide a suitable gripping surface for the Economy machine.

Arriving at the machine in pans from the grinding operation, the valves are dumped into the hopper at the top rear of the machine (see Fig. 1). Action of an oscillating blade which moves vertically through the hopper automatically loads the valves, stems down, into a slot in the blade. The valves slide down the blade and into a loading chute (seen leading from hopper in Fig. 1 and in background in Fig. 3).

A feeding mechanism allows one valve at a time to slide from the loading chute into a tilting cradle arm which moves the work to a horizontal position. A valve in place in the cradle arm may be seen in Fig. 2. Above the arm may be seen the positioning arm which is descending to pick up the valve mechanically and position it directly in front of the chuck. This sequence of operations may be seen in Figs. 3 and 4. After valve is picked from conveyor arm, the arm returns to its starting position to receive the next valve.

Valve is loaded into collet by a pusher (shown in retracted position in Fig. 4)



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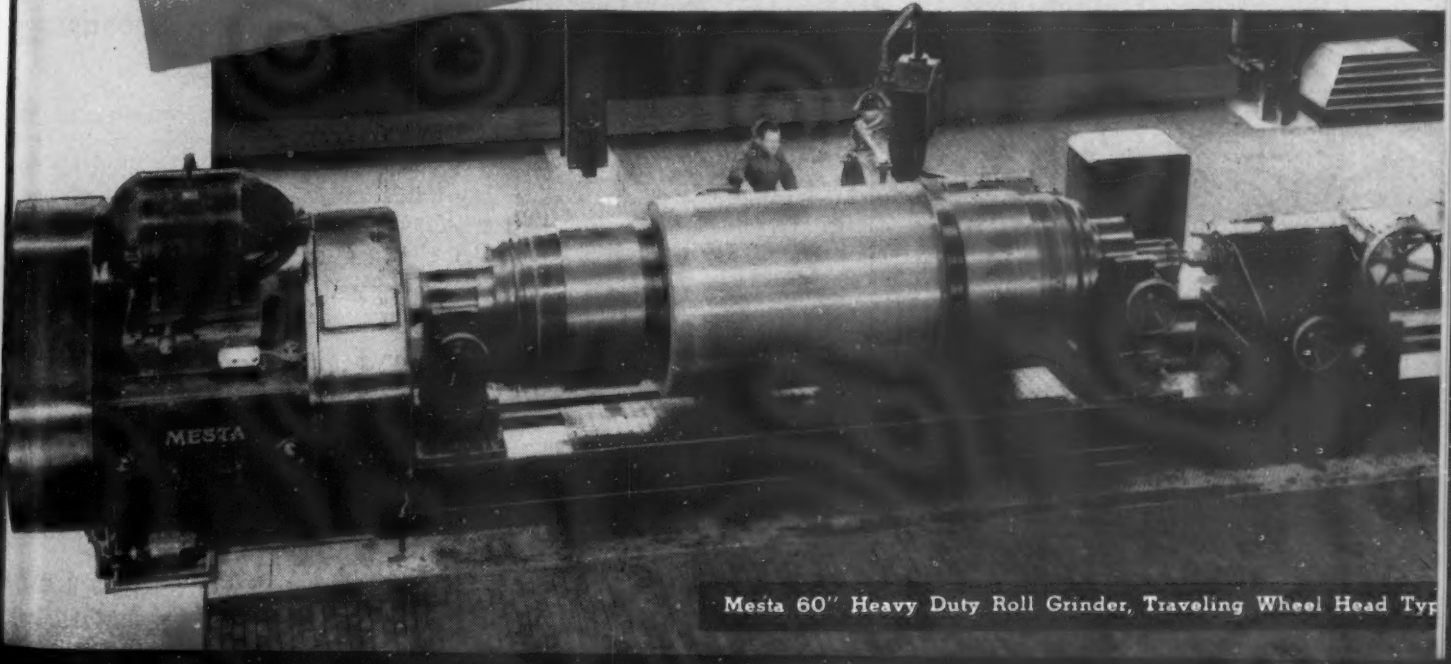


Mesta 60" Heavy Duty Roll Grinder, Traveling Wheel Head Typ

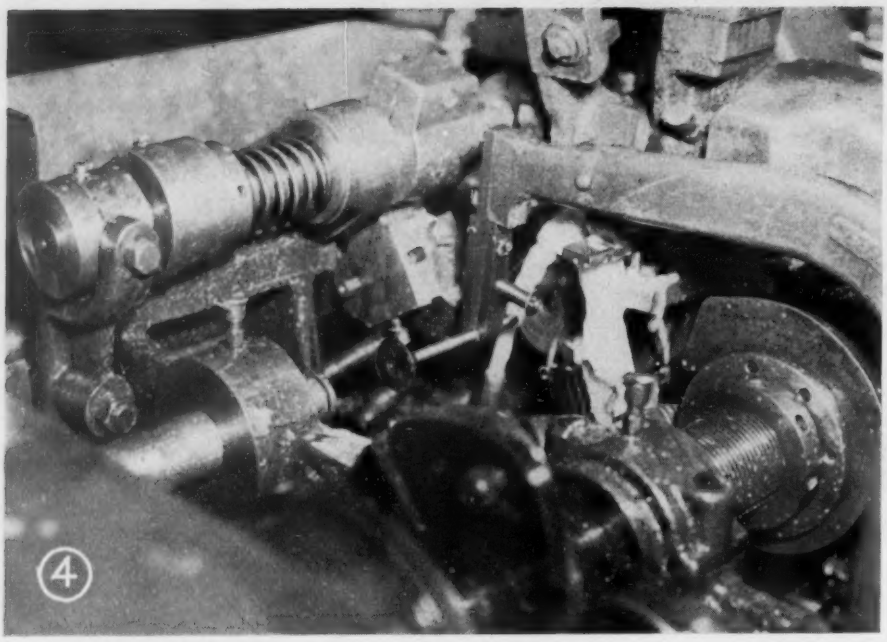


Fig. 4—Positioning arm has placed valve in front of collet, from which previous valve has been expelled. Pusher (seen in retracted position in front of valve head) is about to push it into collet, holding it there until it is clamped in place

which holds the work in place until gripped by the collet. The pusher then retracts and the outside diameter is turned, corner of outside diameter is broken, and the seat is formed.

The outside diameter turning tool is mounted on left side of machine and feeds in radially in an inverted position and the seating tool feeds in radially on the right side of the machine. Both tool holders are fed in by means of a cam mounted directly behind the lever, thereby eliminating any lost motion due to linkages or actuating mechanisms. All tools used in the Thompson installation are carbide tipped.

When the valve is finished it is ejected from the collet into a work pan in the front of the machine. While one valve is being machined as described, the rest of the cycle, i.e., the loading of the positioning arm, is taking place so that when the valve is ejected from the collet, the next valve is almost in position to be pushed into the collet.

This machine, with different tooling, can be used to cut off, face end and machine retainer groove on the valve stem. This is accomplished by means of a turning device which loads the valve head into the collet. A roller steady rest is also employed for this operation. It may also be used for finishing underneath the heads of valves.

The cast iron base of the machine contains the coolant reservoir and chip and work pans. Coolant is circulated by a pump driven indirectly by the spindle motor. The coolant pump operates off a chain and sprocket drive attached to the spindle. Machining operations are by a 3 hp motor driving the spindle and a 2 hp motor driving the camshafts. Control is by three push buttons located at left side of machine. Buttons are for running, jogging (used during set-up) and stopping the machine. Feed and speeds are obtained by two separate variable speed drives, each independently adjustable.

Valves machined by the Economy tool at Thompson are manufactured of semi-austenitic steel containing a high per cent of chromium and nickel.

ASTE Chapter Sponsors Industrial Exhibition

Sponsored by the local chapter of the American Society of Tool Engineers, the West Branch Manufacturers Association, Williamsport Technical Institute and the E. Keeler Co., Williamsport, Pa. is producing the city's 1946 Education Industrial Exhibition, October 21 to 24, inclusive. All industrial concerns within 100 miles of the city, plus machine tool and industrial supply manufacturers who distribute products in that region, are to be exhibitors.

Liquid Protects Metals Against Acids and Alkalis

Corrosion-proofing concrete, bricks, masonry as well as metals can be performed with new liquid perfected by Prufcoat Laboratories Inc., 50 East 42nd street, New York. Applied by brush or spray gun, liquid can be formulated to dry hard and tough or to remain permanently plastic.

With subsequent polymerization, film has virtually a zero acid and saponification number and water absorption rate. Made from special combination of synthetic resins and inert pigments, it can be used on structural steel, pipes, pumps and tanks subjected to continuous dilute sulphuric acid fumes and spills.

X-Ray Reflection Used in Nondestructive Analysis

Value of x-ray in determining composition of a piece of metal that was not replaceable and which could not be damaged in any way was demonstrated recently in the metallurgical laboratories of Sam Tour & Co. Inc., New York.

One x-ray film was made with front reflection using a glancing incidence beam of filtered copper radiation and a 5 centimeter flat cassette. Showing "d" spacings of 2.056 and 1.773, which are closer to cobalt than to nickel, it was decided to use a more precise back reflection method of checking.

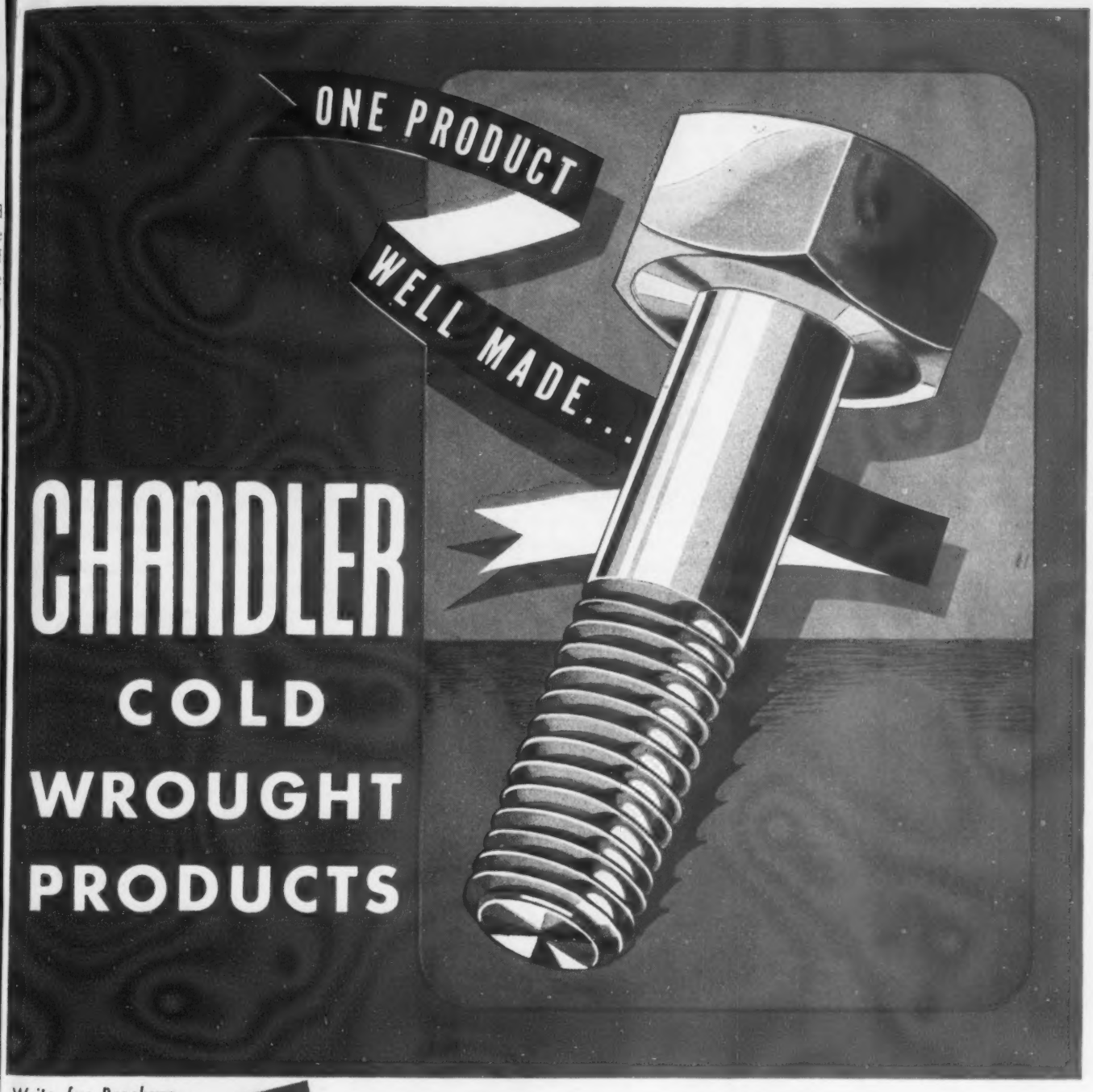
A second film was made with a 3-centimeter cylindrical camera, this film having a sequence of lines of a face-centered cubic structure. A third film, made by back reflection method, with a copper target and a 4.1 centimeter flat cassette, calculated to a lattice constant of 3.592.

Weight and diameter measurements were checked and then the coefficient of expansion was checked and a specific gravity of 8.11 was determined from weight and diameter measurements. Coefficient of expansion over range of 80 to 180° F was found to be approximately 1.5×10^{-6} per degree F. By checking the properties of nickel-iron alloy Invar against the results of the above mentioned tests, it was decided that the material in the piece was Invar.

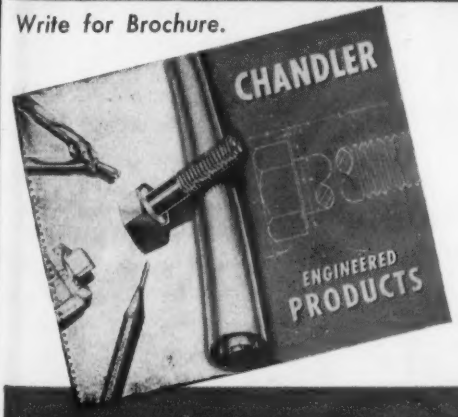
Metal Applicator Speeds Repair of Castings

Equipment which reportedly can be used for filling blow holes in castings, brazing and soldering as well as for repairing cracked engine blocks is now offered by Kerkling & Co., Burbank, Calif. Named the K & W metal applicator, it is completely portable, the transformer, cables, clamp and electrode holder being enclosed in a compact metal case.

The manufacturer states that repair time is reduced with use of the device, largely because fewer pins are used in lacing the crack, and after peening, crack is filled with proper metal in a short time. Vibrating electrode holder may be used in place of standard holder.



Write for Brochure.



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Determining Plate Quality BEFORE WELDING

Experiments with new instrument using supersonic vibrations indicate segregations and inclusions along welding edge can be detected easily on plates 1½-in. and larger

NONDESTRUCTIVE means for studying plates along their edges prior to welding, thereby making possible a selection of those which will weld satisfactorily, was described recently by O. R. Carpenter, welding engineer of Babcock & Wilcox Co., Barberton, O.

The instrument, the Sperry supersonic reflectoscope, tried out in the Barberton plant since last December, is reported to be capable of giving a qualitative indication of the concentration of segregations and inclusions along the welding edge. Most troublesome defects found in arc welds of pressure vessels are cracks and voids, which, it is generally accepted, originate from sulphide inclusions which may be arranged in segregated bands or streaks in the plate material. They occur in any type of weld made in any grade of carbon steel plate, but are seldom found in alloy steels.

In operation, the machine sends supersonic vibrations through the material being tested. It measures length of time required for these vibrations to penetrate the material, reflect from the opposite side, and return to their starting point. By taking advantage of the fact that high frequency sound travels in a straight line, that it is reflected or absorbed by certain physical variations in a material, and that it is transmitted at a certain fixed rate, depending upon the material, it is possible to record the action of sound on an oscilloscope. Thus presence of a defect can be observed, and its location determined.

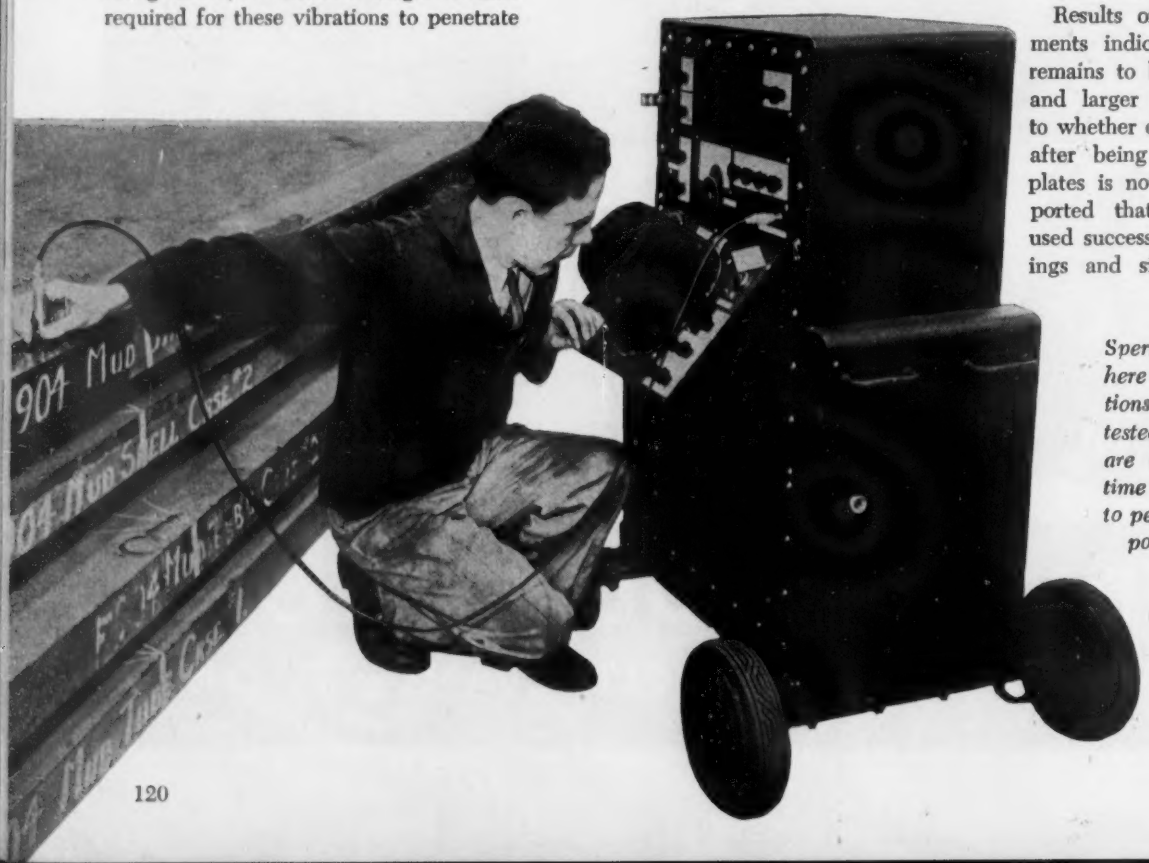
Instrument consists of the proper high frequency oscillator and amplifier. The oscillator may be tuned over a range of frequencies from 1 to 11 megacycles. Output of the oscillator circuit is applied to faces of a quartz crystal having a piezoelectric property which causes it to "grow" when a difference in electrical potential is applied to its faces.

If this voltage is applied at a high frequency, the crystal will vibrate accordingly, producing high-frequency sound waves. The reverse is also true, that is, when a high-frequency vibration is applied to the crystal, a small difference of potential appears on its faces which, if amplified and placed on an oscilloscope, will indicate its response to the vibration in a wave diagram.

It was pointed out that surface preparation is usually a problem because surfaces must be reasonably smooth and flat. Oil is used to assure contact of the crystal to the material so that a flat position is best for the work. Curved surfaces cannot be readily examined without grinding crystals to suit.

Sound beam is transmitted into the material at a fixed frequency or wave length. Area covered by the beam is approximately equal to the area of the crystal, or ½ x ½ or 1 x 1 in. Since sound travels in a straight line, an inspection at one location of the crystal covers a volume in the plate which has a depth equal to the plate thickness and a sectional area equal to crystal area.

Results of these reflectoscope experiments indicate that while much work remains to be done, plates 1½-in. thick and larger may easily be classified as to whether or not they will cause trouble after being welded. Study on thinner plates is now under way. It is also reported that the instrument is being used successfully for testing billets, forgings and similar products for defects.



Sperry reflectoscope shown here sends supersonic vibrations through plate being tested. Flaws in the metal are detected by measuring time required for vibrations to penetrate, reflect from opposite side and return

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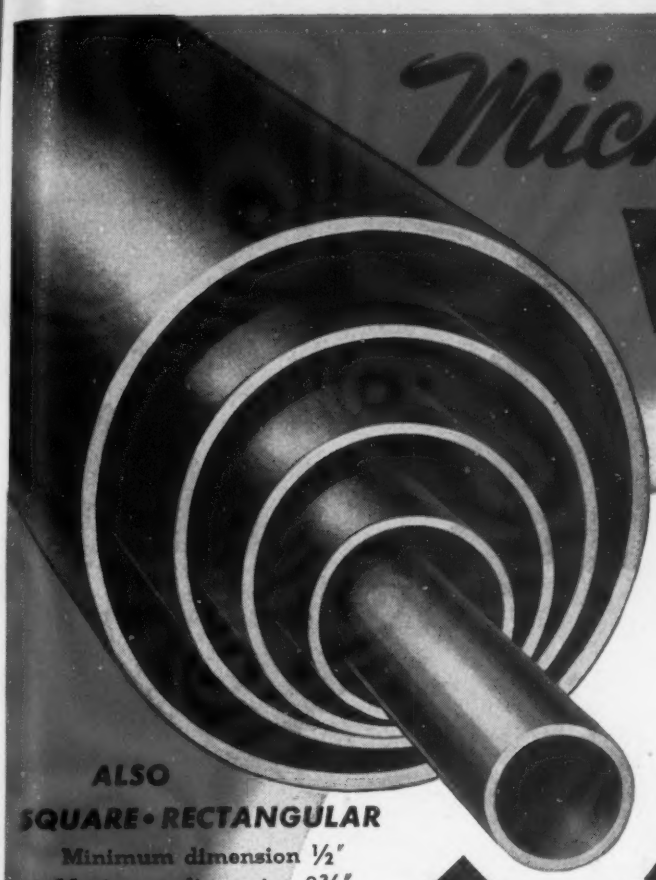

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Removing Dissolved Gases

(*Continued from Page* 111)

The mathematical derivation of the equation presupposes the establishment of equilibrium content of dissolved gas between the metal and the bubble of flushing gas before the bubble leaves the surface of the metal. For this reason better efficiency of flushing gas is obtained by the use of as small a bubble size as possible. There are two reasons for this. First: The smaller the bubble, the slower its rate of ascent and consequently the longer time the bubble will stay below the surface of the metal giving more time for equilibrium to be reached. Second: Flushing depends upon diffusion of dissolved gas into the bubble and the greater the surface area of flushing gas presented to the dissolved gas for diffusion, the more efficient the process will be. It also follows that too rapid a flow of inert gas will accelerate the rise of the bubbles and lower the efficiency.

Even without direct analysis of hydrogen content we may apply the curves quantitatively. The facts known are that 4 cu ft of flushing gas per ton gives sound castings. We can assume from the hydrogen-iron curve that the hydrogen content has been reduced to a point where all the hydrogen would remain in solution in solid alpha iron—a residual of $2 \times 10^{-4}\%$. This corresponds with point 4 on the curve, so that it would seem that more than 4 cu ft of the gas per ton of metal should not be used.

Actual data for aluminum show that more flushing gas is used than would be expected from the results obtained with steel. Aluminum is flushed at temperatures around 1300°F, whereas steel is flushed at 2800°F. Diffusion at 2800° seems to be almost instantaneous, while at 1300° it requires a much longer time with the probable result that each bubble leaves the melt with a lower hydrogen content than would have been the case with more rapid diffusion. Actually about 20 cu ft of flushing gas is required per ton for aluminum.

The primary qualities of a flushing gas are: (1) That it be insoluble in the metal, (2) that it be nonreactive with any of the constituents of the metal, and (3) that it contain no impurities that are soluble or reactive[10, 11]. Where it is desired to remove dissolved hydrogen, it is obvious that the flushing gas must contain no hydrogen or hydrogen compound such as hydrocarbons or water vapor, otherwise the partial pressure of hydrogen in the rising bubble will reach rapid equilibrium with the dissolved gas and the flushing action will be ineffective.

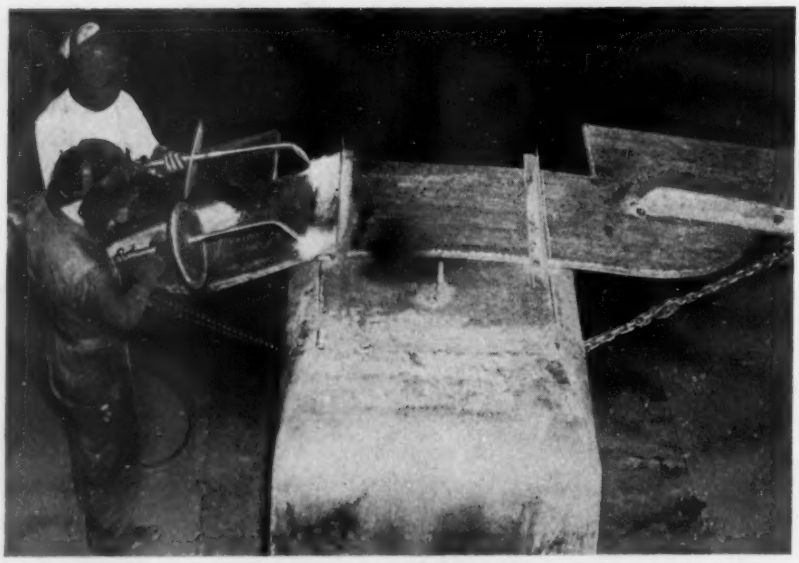
Various Gases Are Available

Gases commercially available for flushing are nitrogen, argon, sulphur dioxide, chlorine, and boron trichloride. Nitrogen, because of its low cost is used for flushing aluminum, copper and copper base alloys, and some types of nickel alloys and steel. In most instances ordinary nitrogen (N_2), which is diatomic, is insoluble in metals and will not form nitrides. On the other hand, some types of steel will nitride with N_2, and magnesium will react violently with it. For this reason the commercially available noble gases are used where nitriding is detrimental. At present argon is the most satisfactory all-purpose flushing gas. It can be used on all metals, and is insoluble and nonreactive. The commercial "welding grade" argon is readily available and contains less than 0.4 per cent N_2 as impurity—the nitrogen in this small concentration remaining inactive.

Helium, if sufficiently pure, should be as effective as argon, but at present, the available helium contains varying quantities of hydrogen which render it unsuitable for flushing. Carbon dioxide could be used, if pure enough, and if no chemical action results. At high temperatures, however, carbon dioxide is very active. Chlorine gas is used to flush aluminum, although it is being displaced by nitrogen. While chlorine and nitrogen are equally effective, the use of chlorine requires special precautions because of its obnoxious and corrosive properties. Sulphur dioxide is used in flushing magnesium. Economic considerations favor SO_2 over other gases, although it is not a pleasant gas to have loose in a foundry. Boron trichloride has been successful as both a flushing gas and grain refining agent in aluminum, but it is considerably more expensive than the ordinary elemental gases.

Aluminum and its alloys were the first metals on which flushing was used commercially[5]. Because the melting point of aluminum is comparatively low, the gas can be introduced into the melt through a closed end iron pipe (Figs. 11 and 14) in which about twenty 1/32-in. holes are drilled uniformly over the last 2 in. The pipe is inserted manually into the crucible or furnace, so that the end is about 2 in. from the bottom. The lower end should be gently moved about by the operator during flushing to distribute the nitrogen through the melt. The operation takes 10 to 15 min.

The rate of flow of nitrogen is low and the working pressure of the gas is just sufficient to overcome the static head of the metal. A brisk bubbling action should be avoided, since violent agitation of the exposed metal bath will invite reentry of hydrogen into the melt from the moisture in the air or in the furnace atmosphere. When flushing in a direct flame fired furnace, the fire should always be shut off, so that the water vapor content of the atmosphere is at a minimum. It has been well established through practice that 20 cu ft of flushing gas will remove sufficient hydrogen



LIP BENDING: Two men shown here are heating 1¼-in. thick steel front lip of dragline bucket, preparatory to bending it to shape. Heating takes approximately 15 min. per side; bending is accomplished by means of a chain jack. According to Linde Air Products Co., unit of Union Carbide & Carbon Corp., New York, use of oxy-acetylene flame for bending and welding increased production over 200 per cent for one dragline bucket manufacturer

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One of the two wheels above was in use for four months on a charging machine where it was daily subjected to repeated loadings of 300,000 pounds. Previously, regular carbon steel wheels would mushroom and have to be taken out of service in two weeks, thus presenting an expensive maintenance problem involving three men to make the replacement. A heat treated wheel of Jalloy steel was substituted and after four months' service removed for inspection. It is the wheel on the right. No appreciable wear can be seen when compared to the wheel beside it that was never in service. If you have an application that requires resistance to abrasion, fatigue and high impact strength write to us about heat treated Jalloy.

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from 1 ton of aluminum to insure sound castings.

With a continuous melting and casting furnace the fire cannot be shut off to flush. In this operation, solid aluminum is continually charged into one end of the furnace and metal tapped out of the other end. The flushing operation is carried out near the tapping end, but the fire is always on. Consequently there is continual exposure of the bath to quantities of water vapor in the products of combustion. Fortunately, the dissolved hydrogen can be flushed out more rapidly than it is reabsorbed, but it is necessary to use 50 cu ft of nitrogen per ton of metal to secure sound castings or 2½ times as much as for a batch operation where flushing is done with fire off.

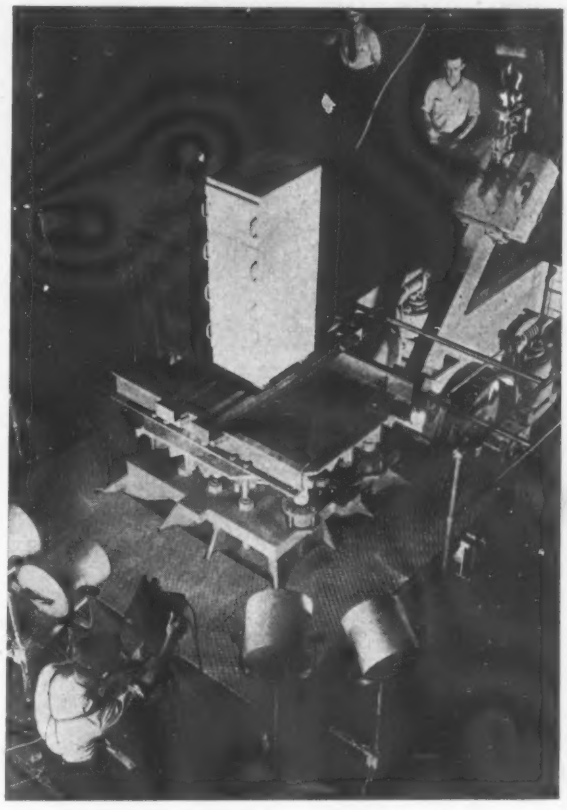
The materials for the injection pipe are readily available for aluminum flushing. Where iron specifications are not too critical, steel or cast iron pipe, either bare or painted with slurry, can be used. Where iron contamination must be avoided, carbon pipe serves the purpose.

Suitable for Alloys

Copper base alloys such as bronze, brass and deoxidized copper can be successfully flushed with nitrogen. In these metals, however, the production of a porosity free casting is more difficult than in aluminum. Referring again to the sources of gas in metals, it will be remembered that there are two types viz., dissolved gases (such as hydrogen) and "reaction-gases" which are evolved on freezing due to a chemical reaction. It is, therefore, necessary to so melt and refine a charge of copper base metal so that there is no possibility of the reaction $2\ Cu_2O + Cu_2 = 6\ Cu + SO_2$ taking place on solidification. No amount of flushing with an inert gas will correct "reaction-gas" porosity.

Little work has been done on flushing brass or bronze in this country, but Baker[12] has presented an excellent review of the work done in England and research is now in progress in this country. From Baker's work it is obvious that dissolved gas may be successfully removed from copper base alloys by flushing. The time of treatment seems to be about 5 min. This is in line with what would be expected from our actual experience with aluminum and alloy steels, and the results are also in line with the theoretical arguments of Geller.

Some tendency prevails to remove zinc from brass when flushing with nitrogen. Zinc has a considerable vapor pressure at 2000°F, and acts like a gas. However, in the experiments conducted thus far, the flushing gas used in a 5 min. period does not appreciably affect the alloy analysis, but the dissolved hydrogen is removed. White fumes are evident but the actual zinc loss is small.



HIGH-SPEED RESEARCH: New research tool is high speed camera shown here taking pictures at 4500 fps of electrical apparatus cabinet undergoing 5500 ft-lb impact test at Westinghouse Electric Corp., Pittsburgh. Hammer weighing 3000 lb strikes underside of platform on which cabinet is bolted, imparting desired impact. When films are projected at 16 fps, failures resulting from severe shock can be easily analyzed

Baker summarized his work as follows:

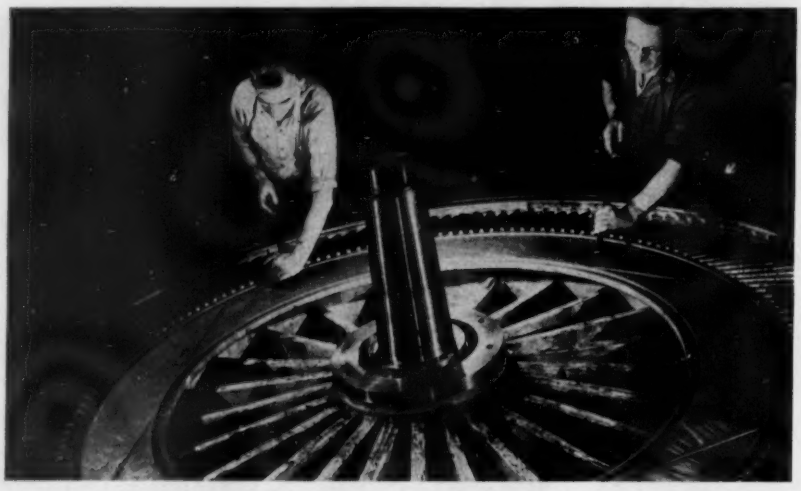
"Treatment with inert gases, with or without fluxes which remove the oxide film, is an effective and reliable method for the elimination of hydrogen. Gas unsoundness may also arise from reversible reactions involving oxygen, and hydrogen, carbon or sulphur. As a general rule, alloys in which oxygen is appreciably soluble may be expected to be liable to reaction gas unsoundness. Alloys containing appreciable amounts of powerful deoxidants, such as phosphorus, aluminum, magnesium, manganese, silicon and zinc, are generally not liable to reaction gas unsoundness, the gas unsoundness, if any, being due to dissolved hydrogen, which may be eliminated by flushing with nitrogen."

An interesting case of the use of nitrogen to prevent porosity in nickel base alloys is shown in Fig. 11. This particular alloy is more susceptible to dissolved hydrogen than most, but a treatment of one minute with nitrogen at 3000°F removed the porosity. Two button samples from the ladle are shown, before and after flushing. The sand casting made from this heat was sound.

Flushing of iron alloys and steels is now on a sufficiently commercial scale so that a good quantitative and qualitative evaluation of the benefits of flushing may be made.

The work of Swinden and Stevenson[10,11] in England did much to emphasize both the benefits and limits of the flushing process. They first carried on a series of tests to determine the effects of gases on electrolytic iron, making aluminum and oxygen additions after gassing the melt with hydrogen, nitrogen, ammonia, carbon monoxide and carbon dioxide respectively for 3 min. They next made aluminum and oxygen additions before passing gases for 5 min. They also investigated the effects of various gases on both rimming steel and steel of the silicon-killed type. From this work they concluded that in killed steel the effect of hydrogen can be removed by a subsequent passage of nitrogen, and an otherwise risen and blown ingot converted into a solid ingot. In unkilled steel the effect of passing nitrogen subsequent to hydrogen does not promote greater soundness under the condition of the experiment because of the constant evolution of reaction gases. Swinden and Stevenson pointed out that the flushing action of nitrogen was purely physical, but further proved the flushing mechanism by later using argon to remove hydrogen and give a sound casting. In the work with argon they also demonstrated the necessity of using a perfectly dry gas. Fig. 10 shows their results.

The ingot at the top is the base metal which is a straight-carbon silicon-killed steel. Ingot H(5) is the same metal cast after 5 min treatment with hydrogen. Ingot H(3)(8) is the base metal cast after 3 min treatment with hydrogen and allowed to stand in the ladle for 8 min be-



POLISHING GIANT BEARINGS: This thrust bearing for water wheel generator such as those at Grand Coulee and Bonneville dams, is mounted on a revolving turntable like a flattened doughnut, ready to be machined and polished to a surface smoothness of ten one-millionths of an inch, at Pittsburgh works of Westinghouse Electric Corp. After being treated with a succession of less and less harsh abrasives, the bearing is given a final polishing by workmen using the palms of their hands

fore casting. Ingot N(5) is the base metal cast after 5 min treatment with nitrogen. Ingot A(5) is the base metal after 5 min treatment with argon. Obviously neither nitrogen nor argon produce porosity. Ingot H(3)N(7) is the base metal after 3 min treatment with hydrogen followed by 7 min treatment with nitrogen. The nitrogen has flushed out the hydrogen otherwise the ingot would roughly correspond to H(3)(8). Ingot H(3) A(7) is the same as H(3)N(7) except argon was used as flushing agent instead of nitrogen.

Commercial application of flushing steel with either argon or nitrogen was not extensively used until about two years ago because of the difficulty in obtaining an injection tube that would stand up at the temperature of molten steel. While injection devices are still in the development stage, several steel companies are using either bare iron pipe or modified stopper rod assemblies to introduce the gas below the surface of the metal. In using iron pipe, 20 ft lengths of ½ or ¾-in. are connected to the gas supply; the gas flow started and the pipes continually shoved into the metal as they burn off. This is producing good results. Fig. 13 shows a badly gassed heat of chromium steel that was flushed with argon for 4 min, using bare iron pipe. Fig. 16 is an illustration of a modified stopper rod assembly, in which the solid rod is replaced by a pipe. The refractory sleeves protect the pipe, and the openings in the plug give a small bubble size which increases the efficiency of the flushing operation. This type of injection device is now being tested, and will soon be available for general use.

It has been demonstrated that flushing with either nitrogen or argon removes dissolved gas and prevents porosity which is caused by the evolution and entrapment of the dissolved gas when the metal freezes. The main mechanical difficulty—that of finding a suitable injecting device—is being solved.

The cost of flushing aluminum is approximately 20 cents a ton using nitrogen. For flushing steel with argon the cost is from 40 to 50 cents a ton. With nitrogen the cost of flushing steel is about 5 cents per ton. There are two aspects to the economy of flushing: First, the percentage of sound castings is increased and the overall cost per ton thus lowered; and second, further economies can be affected by changing refining practices to enable the melters to take full advantage of the process.

Advantage of Flushing

The first point is self evident. Production costs in any shop rise and fall according to the number of ingots or castings which must be scrapped and remelted. By flushing with nitrogen or argon an entire wild heat of steel may be saved.

The other factors in the economy of flushing result from an understanding of the flushing mechanism. In ferrous refining the flushing process is analogous to a carbon boil. When the operator understands this, he can change his whole melting practice to take advantage of it.

In many plants a long carbon boil is necessary to obtain sound metal. The operator can introduce an artificial "boil" by flushing with an inert gas immediately before casting, preferably in the ladle, so the chance of re-entry of hydrogen is minimized. A carbon boil takes considerable time and materials. In electric furnace work, by eliminating a boil in the furnace, appreciable time is saved in working the heat with a resulting saving in power cost. It was by utilizing this feature that one company has made substantial savings over its previous practice.

Moreover, there is evidence that the artificial flushing boil is more efficient than the carbon boil in the furnace. The reason for this is based upon three factors: (1) the rate of bubble propagation, (2) the bubble size, and (3) the distance the bubble travels through the melt. Referring again to Geller's work[8], it will be recalled that flushing efficiency depends upon equilibrium between the dissolved gas in the metal and the partial pressure of the dissolved gas in the flushing gas. Contrast the carbon boil in a shallow bath with the flushing process in the ladle. The dissolved gas is removed in 4 min from the ladle because there is a slow, constant evolution of small bubbles which have to rise 4 to 8 ft through the metal. Here are conditions which promote complete equilibrium between the dissolved gas in the metal and dissolved gas in the rising bubble before the bubble leaves the bath and escapes into the atmosphere. In the furnace the bubbles of CO are large, with small surface per unit volume and greater buoyancy because of their size. With little opportunity for equilibrium to be reached, a prolonged boil is necessary if the boil is for the purpose of removing hydrogen and not just to adjust the chemical composition of the bath.

The question arises with all metals as to which gas (nitrogen or argon) to use, and how to predict when a melt of metal should be flushed. Nitrogen is the cheaper gas and is recommended for all applications in which it is known that under the flushing conditions nitrogen will be insoluble and inert. Thus far nitrogen has proved successful for all nonferrous metals, except magnesium. In steel, the facts are not clear as to when N_2 will combine with the steel and when it will not. Laboratory investigations are being made into the effects of diatomic nitrogen on various steels. Until the results of these tests are available argon must be used where there is any danger of nitrogen reaction.

The question of when it is necessary to flush a melt of any metal is a difficult one to answer. First, experience demonstrates that dissolved gas porosity is much more prevalent in some metals than others, and certain alloys seldom ex-

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hibit defects due to dissolved gas. For example, it is always necessary to flush aluminum if a sound casting is desired. This is one extreme. An example of where a metal would never be flushed is in the case of oxygen free high conductivity copper—although perhaps the whole process of manufacturing this type of copper is based upon the same theory which has been covered above.

An analysis of the dissolved hydrogen in the molten metal before casting, of course, would give an immediate indication as to whether or not the concentration of dissolved gas was high enough to cause porosity. Unfortunately, a method for such an analysis has not as yet been developed and it is necessary to rely on block samples and the expert interpretation of solidification phenomena. By this means extreme cases can be discovered in time to correct by flushing, but in borderline cases the predictions are more difficult.

Melting shops using the flushing process tend to treat more and more heats as by this means the melter is assured of a sound casting. It is believed that, in alloys which are subject to dissolved gas porosity, it is more economical in the overall picture to flush every heat. This is ultimately justified when nitrogen can be used because of its low cost. The use of argon involves more expense and some selective consideration is advisable. However, argon is actually being used on certain high alloy steels giving greatly improved pouring practice at a relatively low cost of 50c a ton for argon.

The following plan is being considered by some acid open-hearth shops, the raw materials for which are steel scrap and pig iron. Pig iron is of a special low-phosphorous grade, because phosphorus is not removed in the acid refining process. The pig is more expensive than the scrap, and extra pig is used to give an excess amount of carbon, so that a prolonged carbon boil can be used to remove hydrogen. The amount of pig could be reduced materially and the overall cost of raw materials lowered by flushing in the ladle with nitrogen to remove the dissolved gas, thereby dispensing with the boil except as it is necessary to adjust the carbon composition.

So far the economic possibilities of flushing have been covered only in view of producing a casting free from porosity. A second important aspect is reducing costs in subsequent mechanical treatment of the castings. Certain steels, such as rimmed steel, which contain porosity, can be rolled and drawn without causing surface defects. Yet in other cases, the porosity will not weld under working and tears or cracks will appear on the surface of finished or semifinished material. These defects must be removed by chipping or scarfing, and if too bad, the piece must be scrapped. Again it should be emphasized that flushing will minimize these defects and tend to cut unit costs because of fewer rejections.

In certain steels, particularly those of high hardenability, flakes or tiny fissures occur in the steel, unless prevented by slow cooling or soaking. Slow cooling extending for days is necessary to be sure that no flakes exist. In a steel susceptible to flakes, hydrogen can be present in amounts too low to cause porosity upon solidification, but in sufficient quantities to exceed the amount of hydrogen which is soluble in the steel at room temperature. Solubility of hydrogen is greater and the permeability less in gamma iron than in alpha iron, and the ease of diffusion decreases rapidly with decreases in temperature, particularly below 500°C. As the steel cools, the solubility of hydrogen decreases (Fig. 8) to the gamma-alpha transformation point: a sudden decrease in solubility then occurs, and, if there is supersaturation, the hydrogen may be "precipitated" at all discontinuities or boundaries. This will produce high pressure and cause stressing which results in flakes; thus the necessity for slow cooling to allow the hydrogen to diffuse out of the solid metal, so there will be no sudden evolution of hydrogen at the transformation point.

Evidence is at hand that flushing reduces the hydrogen content of metal to such a point that flakes are eliminated in high-speed tool steels. The economy here is evident, and flushing will allow a more rapid through-put of material in process and insure flake-free material.

Another benefit of the flushing processes is the removal of disseminated solids from the metal. This is particularly important in aluminum where the specific gravity of the particles is nearly the same as the molten aluminum itself so that the particles tend to hang suspended in the melt. The action of the rising bubble of flushing gas is similar to the flotation of minerals. The particles attach themselves to the surface of the bubbles and are floated to the top of the bath where they combine with the slag.

A complete picture of the flushing process would be incomplete without a discussion of the limitations of the process. Shrinkage porosity will not be eliminated by flushing. As pointed out before, the porosity caused by reactions where the end product is a gas, will not be affected by flushing. Moreover, it is difficult to tell in some cases whether porosity is due to dissolved gas or reaction gas, so that in applying flushing, the whole refining procedure should be carefully examined to be sure that the metal will be free of reacting constituents at the time of solidification. Trapped air or air injected into a mold by the falling stream of metal will cause porosity, which, naturally, cannot be eliminated by flushing. Porosity caused by moisture can occur because of molds which are not sufficiently dry or by mold washes which contain hydrocarbons that are not burned off ahead of the rising metal in the mold.

Flushing is a useful tool in producing sound castings. It is successful when used to supplement good refining and casting practice, and gives melters positive control over dissolved gas porosity. It helps in uncovering other sources of gas pickup.

A great deal of work remains to be done to further develop the process but even in its present stage it is economically solving a problem that has plagued steelmakers for ages.

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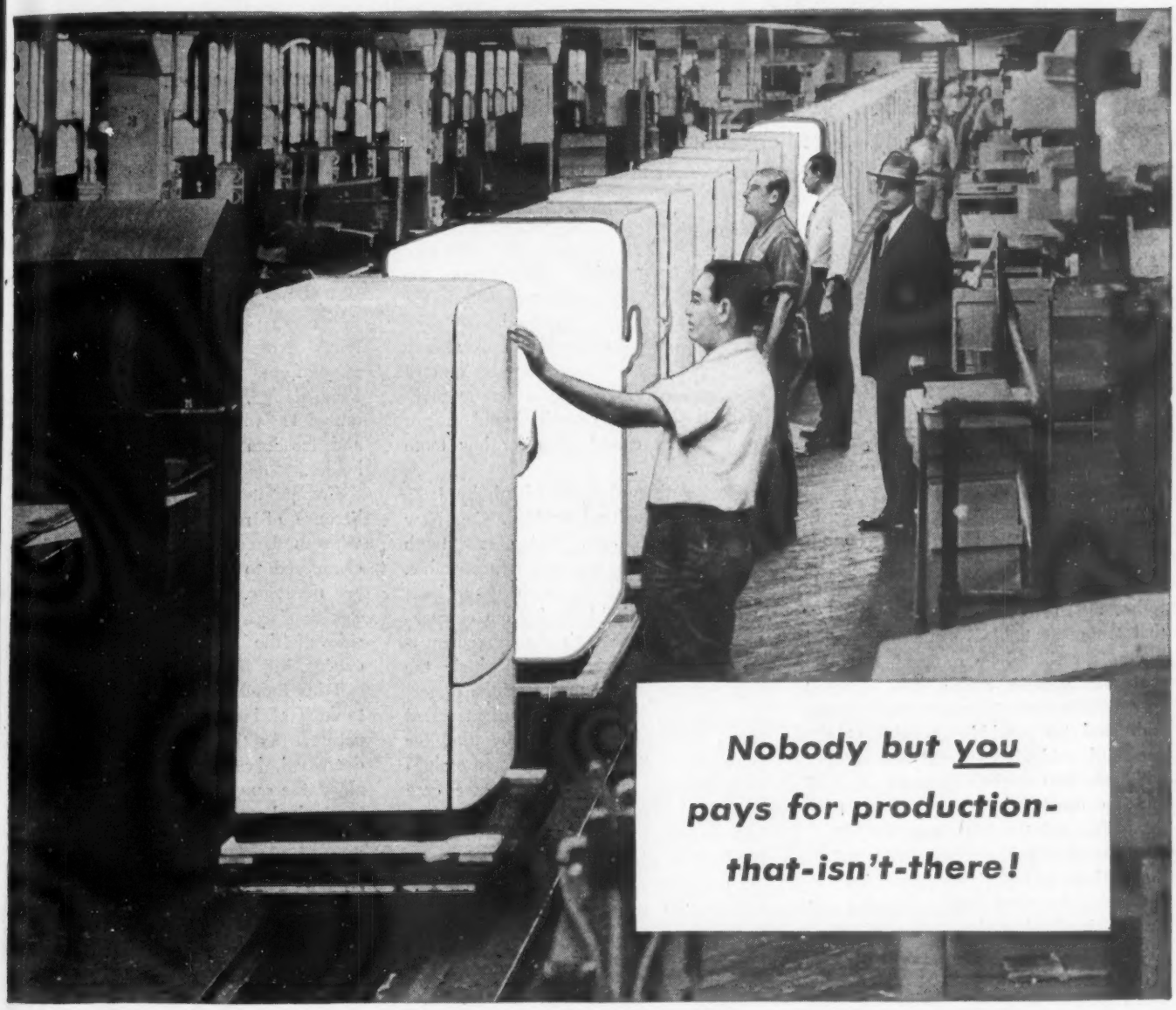

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New mill motor wins favor of electrical superintendents, designers and users. Surface skin on collectors greatly influences brush life and maintenance expense. New coil annealing furnace affords many advantages. Procedure for storing scrap at an Ohio steelworks prevents contamination

MILL motors built along a new line wherein the next higher horsepower rating is put in a frame one size smaller than previous, came in for wide discussion at the opening technical session at the annual meeting of the Association of Iron and Steel Engineers, Public Auditorium, Cleveland, Oct. 1-4. Features of the convention were reported in the Oct. 7 issue of STEEL.

Answers to a questionnaire previously sent to various electrical superintendents, designers and users of mill motors for their opinion were summarized as follows: In general the majority felt that the present AISE standard physical dimensions should be retained, and also that the present frame sizes covered their requirements although some felt that additional sizes would be desirable. About one-third said they would be satisfied with only two motor ratings—a one-half and an one-hour rating. About two-thirds favored the 75C limit rise.

Abstracts of other papers presented at the various technical sessions follow:

Gearing for Steel Mill Auxiliaries and Cranes, by L. J. Collins, General Electric Co., Schenectady, N. Y.; the cost of manufacturing a gear or pinion of a given pitch diameter, face width, and diametral pitch, is not influenced by the choice of pressure angle. From a noise standpoint, a 20° tooth is quieter for small numbers of teeth since there are more teeth in the arc of action. As the tooth numbers are increased, there should be no difference in the performance of either, from a noise standpoint.

Advantages which may be gained by choosing 20° stub teeth in preference to 14½° standard teeth where the tooth numbers are low, the following desirable characteristics are apparent: (1) The surface compressive stress was dedecreased. (2) The number of teeth in the arc of action was increased. (3) The beam strength of the teeth was increased. (4) There is no increase in the cost of manufacture. (5) From a noise standpoint the 20° stub tooth should result in a quieter combination for low tooth numbers.

Corrugating of Sheet Metal, by J. E. Kiefer, Streine Tool & Mfg. Co., New Bremen, O.; Sheets having saw tooth corrugations are no longer acceptable. To overcome this backlash gears have been added to hold the bottom corrugation dead in line with the top corrugation. The accuracy with which the rolls and dies are planed is of the utmost importance. To secure a perfect rolled sheet, a set of dies should be used for each gage. Because the cost is prohibitive the dies are made to take care of several gages and to corrugate a perfect sheet half way between these gages. Production obtained on the corrugating machine varies considerably depending on the gage and the speed with which the operator works. From one to five sheets per pass may be corrugated.

Modern Trends in Brush Operation, by L. D. Cook, Commonwealth Edison Co., Chicago; Surface skin is not only the most important factor relating to collector wear, but is also the first consideration in the matter of brush life and maintenance expense. The film has the property of enabling the brushes to operate at a relatively low rate of wear. Usually porous or open grained brushes of the lower mechanical strength are associated with the formation of the heavier films more than are the dense brushes.

A firm contact between brush face and commutator is essential to satisfactory brush performance. It is this function that the brush holder is called upon to perform. Many holders are not of ideal design, so additional care is required in order to insure proper tension and freedom of movement within the holder.

Commutators should be ground either because of roughness or in connection with undercutting. They should be chamfered to remove and prevent copper dragging, and to remove any mica fins that may have been left al ng the side of the slot by imperfect undercutting.

Tests indicate that brush trouble due to lack of humidity is of an explosive nature. As the humidity of the air is decreased, brush life and operation are about the same until a low critical point is reached somewhere near 1 grain of water per cu ft of air. At this critical point, friction increases to many times normal amounting to seizure of the metal at point of contact. The heat produced by the excessive friction breaks down the finder and brushes dust away in a matter of minutes. This condition, however, does not maintain with peripheral speeds below 3000 fpm and therefore it is not necessary to humidify where speeds are below this point. For safe operation, experience has shown that on high-speed machines the humidity should not be allowed to fali below about 1.25 grains of water per cu ft of air.

Spot Conversion for Adjustable Speed, by R. A. Geuder and W. R. Hough, Reliance Electric & Engineering Co., Cleveland. Range and flexibility provided by variable-voltage drives greatly

simplifies machine design through the elimination of gears, belts, pulleys, and clutches. An outstanding example in the steel industry is tension winding where with older types of drives some sort of speed changing such as a slip clutch had to be provided to compensate for coil buildup as well as lineal speed change. In machine tools, a multiplicity of gear changes has in many cases been entirely eliminated or reduced to a single gear change.

Increased production has been achieved in a number of ways. One has been through the ability with a variable voltage drive to operate at the optimum speed. Others have come about through the reduction in setup time through the ease of speed selection and speed change, and through the close control of acceleration and deceleration which is possible with this type of drive. Production also has been increased by these spot conversion units through the flexibility they have introduced into plant layout and arrangement of equipment.

Submerged Combustion in Industry, by W. G. See, Submerged Combustion Co. of America, Inc., Hammond, Ind. With submerged combustion the products of combustion are exhausted directly into the solution. This creates a terrific agitation and when used in a pickling solution, the dilute sulphuric acid is agitated and moved about the vat at a rate which would be extremely difficult to achieve mechanically. As a result, the average pickling time on various grades of steel is reduced 40 to 70 per cent of former practice if the operating temperature is held the same as it was with steam. Agitation also serves to keep the temperature extremely uniform throughout practically any size tank.

On a bar pickling installation when steam was used, the total average lb per tub hr for one year was 9542. When operated under submerged combustion conditions this figure increased the following year to 26,138 lb.

In many plants, the boiler is run in the summer only for the pickling room. A submerged burner in acid vats and immersion heaters in the lime solution or alkali tanks permits the boiler house to shut down completely during warm weather for even greater savings in heating costs. One plant operating under these conditions found it advantageous to discontinue operating the boiler and to heat the plant with a coal fired hot air system.

The submerged combustion system consists of a controlled assembly design so that the operator or watchman has only to press a starting button to put the entire unit in operation. All the workings of the entire unit are completely automatic.

In many cases the use of submerged burners afford a total savings of about 50 per cent of present picking costs. Production is increased and labor costs are decreased proportionately. As the number of rejections due to improper cleaning are reduced, a more uniform product is obtained. Frequently it is possible to retire the initial costs of the units in one year from the savings effected by their use.

A New Method of Coil Annealing, by H. H. Armstrong and F. F. Schlitt, Lee Wilson Engineering Co. Inc., Cleveland. The authors described a new type of annealing furnace that combines the advantages of radiation, convection, and conduction of heat. To all external appearances, this furnace construction is identical with the standard type of bell furnaces with the exception that the piling height has been increased by a considerable amount and in the multiple stack furnace type, the units would be constructed in single rows in order to secure rapid cooling as well as rapid heating. The furnace is heated with radiant tubes, and inner cover over each stack of coils, and a recirculating fan operates under each stack of coils.

The coils are placed on the base platform in the usual manner, but below the bottom coil and between each of the coils above there is placed a coil spacer or compensating convector which provides a path for recirculating gases to pass between the edges of the coils in the stack. This is the path through which the heat is delivered by convection to be conducted away by the coil edges towards the center of the coil.

Gases are circulated by a high capacity fan with a high static pressure characteristic and these gases are driven up between the inner cover and inner line which provides velocity of about 50 fps at which an extremely high rate of heat transfer can be made by convection.

With the particular system of heat transfer not only is the heating time shortened but the cooling time is reduced in the same proportion. After full coil penetration to the uniformity desired, the furnace bell is removed for use on an adjacent base. All the elements which contribute to the fast input of heat contribute to its removal so that

Iron and steel exposition was the first since 1941

REMOVING FORGING DIE: Forging die weighing more than 1500 lb is lifted out of 6000 lb drop forge hammer at Edward Valves Inc., East Chicago, Ind., by fork truck manufactured by Clark Tructractor, Battle Creek, Mich. All die changes in the Edward forge shop are handled by 4000 lb electric carloader type truck with 36-in. fingers and a 108-in. lifting height

the length of cooling cycle is but little longer than the heating cycle and therefore the number of bases used per furnace is slightly over two. Thus an installation of five furnaces would require about 12 bases for the operation of the equipment.

On 4-stack furnaces the ratings lie between 4 and 6 tons per hr for small and medium sized coils respectively. When coils of larger diameter are available, correspondingly larger tonnage rates are to be expected. With mild steel inner covers the tube temperatures are limited to 1550° F. to prevent excessive scaling. However, with the use of alloy or alloy clad inner covers, it is possible to employ tube temperatures at least 100° higher.

Advantages of the new furnace follow: Large increased uniformity of heat application, more tons per hour in a reduced floor space, more tons per hour from each furnace, a reduced first cost for a given tonnage to be annealed and a reasonable time for large diameter coils.

Plugging Methods for Mill and Crane Motors, by E. J. Poffelt, Cutler-Hammer Inc., Milwaukee. In considering factors in the design of plugging control equipment the author points out that by using a plugging contactor which has a closing coil and a holdout coil, a separate plugging relay is not required. A dry type rectifier is connected in the motor armature reversing loop in combination with the plugging contactor holdout coil. The rectifier permits current to flow energizing the holdout coil when the motor countervoltage is in one direction, but not in the other. The plugging contactor is thereby controlled so it can always close when the motor is started from rest and it will protect the motor and load when the motor is plugged. The number of electrical interlocks required are reduced to a minimum.

Power and Power Factor in Arc Furnace Operation, by E. H. Browning, Westinghouse Electric Corp., East Pittsburgh, Pa. Of great importance in the operation of direct arc electric furnaces is the proper selection of tap voltages and corresponding arc current values. The arc current value resulting in maximum power input to the furnace at the best power factor is fixed by the furnace electrical circuit constants. Therefore, as an aid to the operator, it is advisable that a chart be posted on or near the control panel giving the maximum values of current to be used with each tap voltage utilized during the heat period.

One suggested method for helping the melter achieve the conditions of optimum power input at a satisfactory power factor concerns the use of three secondary single-phase watt meters in place of the presently used three single-phase ammeters. The operator then could adjust his furnace regulator such as to obtain maximum input by reference to these watt meters. This permits a more evident means of indicating the correlation between adjustment of the regulator current adjusting rheostats and the power input to the furnace.

Achieving satisfactory power factors and desired furnace power input comes about through determining by test the nature and constants of the electrical circuit of each furnace installation. Once this is done and necessary data have been collected, characteristic curves of the given furnace electrical circuit may then be plotted and the condition for optimum operation established. These curves will indicate differences in magnitude and condition between total circuit power and the useful power actually available in the furnace. Information thus obtained can be used as an aid for the furnace operator and for the application of auxiliary equipment to the furnace regulator such that improper operation is automatically prevented.

Automatic Welding in Steel Plant Maintenance, by H. E. Holman, Jones & Laughlin Steel Corp., Pittsburgh. Monorail cranes frequently limit the size of the work and are not as flexible as an overhead crane in such matters as organizing incoming and finished work, wire and flux handling and general shop arrangement. When all new wire is weighed, labeled and stored in vertical stacks around core poles, storage space is minimized and added to the ease of periodic inventories. The value of this manner of storage is important also because of the various outside diameters of the wire coils. High alloy coils frequently are drawn in weights of 25 lb while straight carbon coils may run from 60 to 200 lb. All wire used should be clean, and preferably clad to provide good electrical contact with the jaws of the welding head.

Provisions also must be made for flux storage. It should be stored in a dry area and handled so that the bags are not broken before the approximate time of consumption. If excessive flux dampness becomes a problem, it should be thoroughly dried before using.

Practice on vertical rolls for strip mills in past years was to forge them from 0.45 per cent carbon steel and place them in service at a 20 in. diameter. These rolls could be dressed from three to four times and then consigned to

(*Please turn to Page* 169)

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Machining Stainless Steels

(*Continued from Page* 113)

Filing and Sawing Stainless Steel: Filing stainless is seldom given much thought or consideration primarily because the job can always be filed somehow or other with such general purpose files as are usually found in any shop. With the more widespread use of stainless steel in all industries, this problem was investigated by various file manufacturers who are now making files especially for stainless steels. These files are generally marked "for stainless steel".

While regular files will cut stainless, they do not hold their cutting edge as well as those made especially for this task. A special type of tooth makes possible much longer file life. A few drops of heavy base oil applied on the file not only help to produce longer file life but stop chip loading, and permit smoother cuts.

Straight chrome types and the free-machining grades of stainless present very little difficulty, it is the 18-8 type which requires care, and the important thing to remember is to take enough of a bite to keep the file cutting. Otherwise the surface will become glazed and make filing difficult. When filing stainless, use a light pressure and a slow steady stroke. Fast strokes and "laying hard" on the file only make it more difficult to cut and wear out the teeth faster. Specify files "for stainless steel" for best results.

Possibly the most neglected and abused piece of equipment in a shop is the saw. Fortunately, saw cutting at no time has really presented any major problem. There are times when sawing bars is necessary, and for those who are not familiar with sawing stainless these suggestions are offered.

On bars up to and including 1-in., a band saw works very well. Use a saw blade with 14 teeth per inch, running at a safe speed of 110 fpm. If band saws are used with over 15 and up to 18 teeth per inch, cut the speed down to 100 fpm.

On bars over 1-in. round it is best to use a hack saw having 6 to 10 teeth per inch and running about 60 strokes per minute. Hack saw blades with the smaller number of teeth are preferable because the latter provide plenty of chip clearance, and packing will not occur, (see Fig. 16). Use a low positive pressure on the blade. Any good coolant is satisfactory.

Only exception to this recommendation is when sawing thin gage material or tubing. This requires a fine tooth saw of about 24 teeth per inch so that at least two or three teeth are cutting all the time. A coarse tooth saw, besides bridging the work, will gouge out metal and break the teeth.

Stoning: A good sharp cutting edge is like the one shown right of Fig. 15 which has an unbroken line that carries an equalized load. Compare this with the edge shown at left—here high spots or peaks carry the load. These unsupported peaks cannot bear the brunt of such loads for long and therefore break off, leaving flat spots that rub and tear the work. This condition also generates excessive heat through friction, which frequently burns the tip of the tool. The ultimate result is increased "down-time" for regrinding.

No machine operator will question the value of a sharp cutting edge. The longer this edge remains sharp, the longer the tool will cut between grinds, and produce a better finish on the job. A tool with a "rough coarse" grind will transfer its mark to the work, giving a poorer finish. It also has a tendency to decrease the life of the tool between grinds.

"Down-time", whether for grinding tools or anything else, means less production and higher costs. While tool grinders have known this for years, there has been an old fallacy that the cost of producing finely ground, smooth edges is as much as the benefits obtained. It has often been overlooked that in the past few years grinding wheels and grinding techniques were greatly improved so that getting a smooth cutting edge is no longer a slow or costly operation.

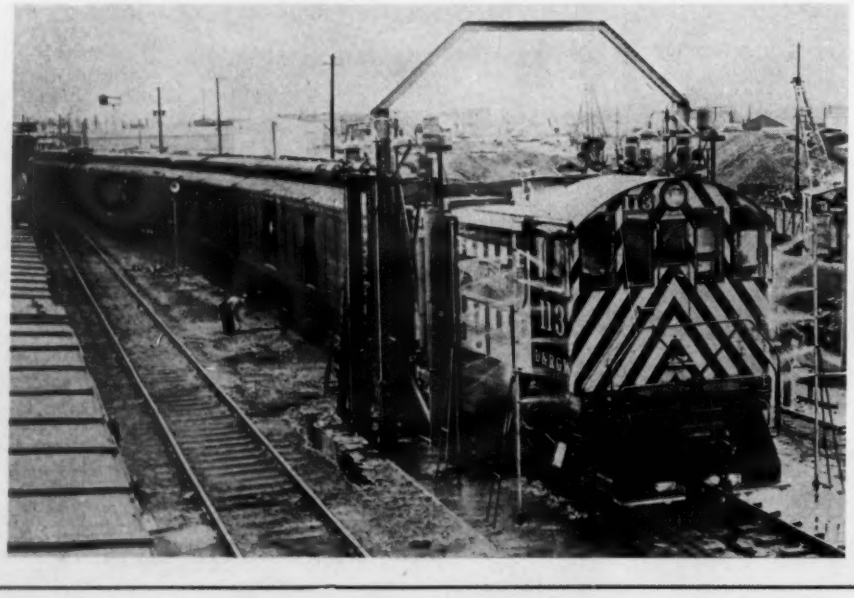
Close observation on many types of cutting tools reveals that by careful grinding and stoning, tool life is increased from 10 per cent to as high as 60 per cent between grinds. Positive results, which can easily be observed, are finer quality of work produced, increased number of pieces between grinds, less power consumption and fewer grinding wheels used.

Most commonly used grinding wheel in shops today is the 60-grit wheel. After the rough grind is made, some operators take one or two passes over the [illegible] with practically no feed. This gives a fairly good edge and finish. After the worn edges are removed with a 60-grit wheel, experience indicates it is desirable to go one step further and finish up with a very fine (120 grit) wheel. A further point regarding fine grit wheels is that the operator will be more careful not to rush the work since "hogging" may produce not only slight burning of the tool but possibly fine grinding checks.

Advantages obtained from careful grinding and stoning may be summed up as follows:

(1) Stoning produces an exceptionally good, sharp cutting edge that carries an equalized load along its entire length.

(2) Stoning increases tool life from 10



TRAIN WASHING: Spraying and scrubbing are performed simultaneously by this new car washer in the Burnham yards of the Denver & Rio Grande Western railroad. As locomotive enters washer, sprays are turned on and six rotary tampico brushes powered by General Electric motors close in on train on both sides. Brushes are driven by four 3-hp and two 2-hp 1800 rpm vertical motors. Ten regular trains plus specials and locomotives are washed daily

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Many foundries still prefer standard speed snagging wheels for swing frame or floor stands, rather than high speed operation. For this group, extremely tough Sterling Vitrified Snagging Wheels have been developed for cool operation and fast metal removal.

Backed by constant laboratory analysis and years of engineering experience, Sterling's "Wheels of Industry" are the logical choice where cleaning room operations must be quick and profitable.

Sterling's engineers, skilled by long association with all kinds of foundry grinding problems, are ready to solve yours. Feel free to ask for this service.

Send today for the Sterling Specification Selector . . . picks the wheel you need . . . makes selection easy.

· STERLING ABRASIVES ·

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

per cent to 60 per cent between grinds.

(3) Stoning is neither a slow nor costly operation, thanks to better grinding wheels and techniques available today.

(4) More work is produced between grinds, and better finishes are obtained with a well "stoned" edge.

Lubrication: The formation of chips in the machining of metals develops high stresses. As the chips move over the cutting edge of the tool they generate considerable heat and pressure due to friction and deformation of the metal. Because all metals tend to weld under the combined action of pressure and temperature, there is a natural inclination for the chip to weld to the tool. Lubrication reduces friction, metallic welding, scuffing, and holds down temperature. Good lubricants or coolants draw out and dissipate the heat.

Sulphur was recognized for years for its ability to cool and prevent seizing. As a result, properly blended sulphurized base oils are now the standard lubricant and coolant for machining all types of stainless steels. Oil engineers and manufacturers recommend two types of sulphurized oil—

(1) A sulpho-chlorinated petroleum oil containing active sulphur and approximately 8 to 10 per cent fatty oil. Viscosity approximately 200 sec at 100° F.

(2) A sulpho-chlorinated petroleum oil containing active sulphur without a fatty base oil. Viscosity approximately 130 sec at 100° F.

Oil No. 1 is generally used for the non-free-machining types of stainless. Oil No. 2 usually is preferred for the free-machining grades. Either of these oils, depending on the work being done, can be used straight or cut back with a blending oil—the best of which is paraffin, usually starting with a mixture of 1:1.

Watch the tools and if excessive wear is observed, paraffin blending is needed in the oil. If the chips weld to the tool or the tool burns, too much paraffin blending oil is present in the mixture. In that case, an addition of more sulphur base oil of either type 1 or 2 is indicated.

Following suggestions are a good starting point for mixtures of sulphurized oils and paraffin for various types of machining operations (slight variation of the mixtures may further improve results):

(1) When using high speed, light feed automatic screw machines, principally for turning, forming, and cut-off operations on the free-machining types, use one part of sulphurized oil to five parts paraffin.

(2) When using screw machines at normal or average speed and including threading, tapping, drilling and milling operations on the free-machining grades, a good starting point is with three parts paraffin to one part sulphurized oil.

(3) For such jobs as coarse bolt threading, nut tapping, broaching and pipe threads, a good start is two parts paraffin to one part sulphurized oil.

(4) In general, when machining 18-8 grades of stainless (except the free-machining type) use a mixture of one to one of the No. 1 type oil and paraffin.

(5) A good rule-of-thumb for starting new jobs is to remember that the tougher the steels, such as Type 302, Type 329, Type 420, Type 440, etc., the more sulphurized oil is needed. For free-machining steels such as Type 416, Type 430-F, Type 303, etc., the mixture can contain a larger percentage of paraffin base oil.

Efficiency of the coolant and lubricant is governed by the size and form of nozzle through which it is delivered, as well as direction, position, pressure and volume of the supply of the oil.

Keep in mind that the best oil is no good unless it constantly floods the work and tool as in Fig. 18. The set-up shown in Fig. 14 illustrates a good method for flooding tools and work with plenty of cool oil at high pressure. Each stream plays directly on the work as well as the cutting edge of the tool. This particular set-up shows remarkable oil economy, greatly increased tool life, and produces excellent finish of the work. Further, it eliminates a fault sometimes encountered where the tool holder moving into the work intercepts the flow of the coolant so that it has no way of reaching the area where the cutting is being done.

When cutting oils get too hot they lose their ability to carry away the heat from the tool and work—then size accuracy and finish suffer. In general, temperature of the lubricant or coolant should not exceed 140° F. For best results the temperature should be held within the range of 75° F to 125° F. One way to eliminate the problem of "hot oil" is to make certain the lubricant in coolant tank is kept full at all times. Oil loss is caused by evaporation and adherence to the chips and work, so check oil frequently and add to it whenever necessary.

Some screw machine parts are made from the hardenable types of stainless steel which are heat treated after machining. If such is the case, parts must be very thoroughly washed and cleaned before they go into the heat treating furnace. Any oil remaining on the work will burn to a hard, crusty scale making it difficult and expensive to remove. Excessive pickling of heavily scaled work may result in undersize parts and a badly etched surface.

Oil aids in chip removal and, with high pressure, will float the chips away from the work. This is important, because if chips are not cleared away, they will divert the flow of oil from the work and tool.

A common fault, easily overlooked, is cleanness of the oil. Dust, grit, fine chips and other contamination can easily get into the oil tank, and can ruin the finish of the work. Replace with clean oil whenever necessary, but before doing so tank and pipes must be cleaned to remove all dirt or contamination. The machines themselves are great gatherers of dirt which finds its way to the oil tank. So clean the machines, too. Remember—just adding new oil does not remove the dirt. Consequently, a thorough cleaning at regular periods is necessary if good work is to result. This is particularly advisable where considerable drilling, tapping or threading is being done.

Some of the common troubles of dirty or contaminated oils can be avoided by keeping surplus oil in well closed drums. Not only does this keep out dirt, but stops the danger of refuse from getting into the oil. Some lubricants are affected by extreme cold, therefore, it is best to keep drums indoors.

Frequently fine finished ground and polished bars are shipped from the mill with a light oil sprayed on them. This is to prevent scratching or marring the bars during transportation. Such oils are not good lubricants and repel the cutting oils. Therefore, to get the best out of the cutting oil, any excess "shipping oil" should be removed before the machining process.

Proper lubricants and coolants, properly applied, assure longer tool life, heavier cuts, higher speeds, better finishes, and fewer scrapped parts.

Grinding Fixture for Multioperation Jobs

Wide range of operations is handled by a new axial relief grinding fixture placed on the market by Govro-Nelson Co., Detroit. According to the manufacturer, holding device is adapted to grinding cutting edges, steps, flutes and chip relief on milling cutters, burring tools, counterbores and other similar items.

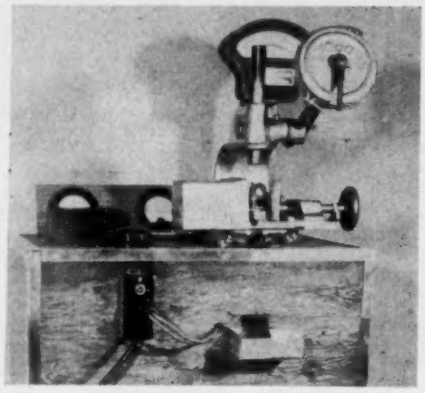
Fixture is said to perform most grinding jobs with standard wheels, and can be used on surface grinders as well as on cutter grinders. Adjustments are simple, with instant conversion from right to left hand and vice versa.

Industrial Equipment

Powder Metal Press

Hot pressing powder metal parts, especially aluminum, copper and other nonferrous metals, is performed on laboratory model of machine, immediate right, designed by National Diamond Hone & Wheel Co., 108 Fulton street, New York 7. Using 3/16 x ¼-in. slugs, laboratories can test structure by actually breaking down or building up tailor-made alloys. Carbon dies heated on 115 v ac circuit will last for as many as 30 or 40 pieces. To obtain excellent densities, pressure of only 100 psi is required during hot pressing operations. Machine measures 36 x 36 x 38 in., and weighs 150 lb.

Steel 10/14/46; *Item No.* 9855



Induction Heater

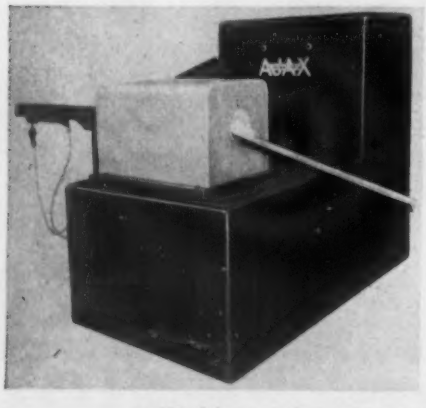
Continuous automatic heating of steel slugs prior to forging is done by induction heater, directly below, designed by Ajax Electrothermic Corp., Trenton 5, N. J. Production rate with slugs 3⅜-in. in diameter and 1¾-in. long, is 350 per hour, with each slug heated uniformly to about 220° F. Power source is a 200-kw motor-generator set, operating at about 1000 cycles per second. Cold slugs are loaded into roller type chute on left side of heater, fed continuously through horizontal heating coil by pneumatic ram and dropped out other end of coil, ready for forging dies.

Steel 10/14/46; *Item No.* 9858

Portable Plating Barrel

Designed for small quantities of work, the portable barrel plating development, center below, is recent product of Hanson-Van Winkle-Munning Co., Matawan, N. J. Unit is furnished with steel, monel, rubber or bakelite cylinders for cleaning, pickling or plating, respectively. Apparatus is furnished with special Janette motor-reducer to drive cylinder at 1.6 rpm for cleaning and 5 to 6 rpm for plating. Unit with 6 x 12-in. cylinder is approximately 20 in long, 16 in. high, weighing about 70 lb. Cylinder will hold about 2 qt of work.

Steel 10/14/46; *Item No.* 9856



Safety Loading Bridge

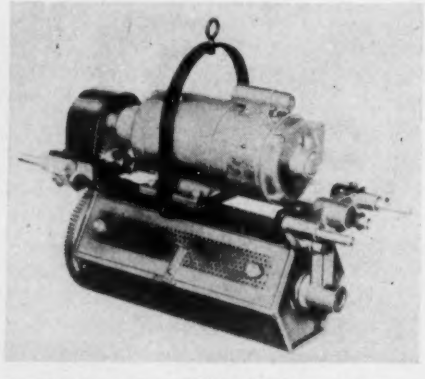
Possessing a positive locking device, side guards, nonskid surface and beveled edge for easy entry, the steel safety bridge over which truck is passing is manufactured by Craig-Holden Associates, Box 866, Fort Worth, Texas. Bridge, lower right, is used to span distance from loading platform to railroad car.

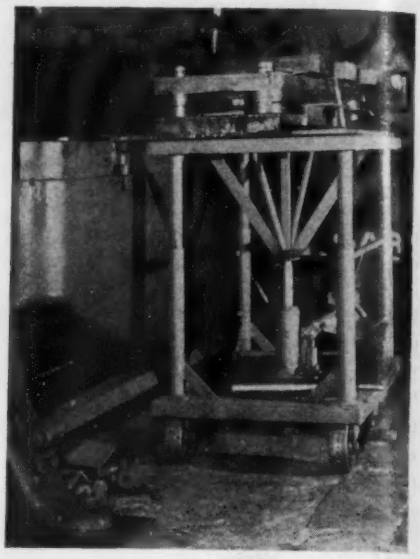
Steel 10/14/46; *Item No.* 9857

Utility Table

Hydraulic utility table, upper right, is handling a die set weighing 800 lb. A product of Rack Engineering Co., 5102 Butler street, Pittsburgh 1, table is mounted on heavy duty roller bearing casters 6-in. in diameter with a swivel arrangement permitting easy maneuvering of capacity load. Rated at 2000 lb capacity, table raises load by foot pedal, leaving operator's hands free during lifting operation.

Steel 10/14/46; *Item No.* 9854





Hydraulic Jacks

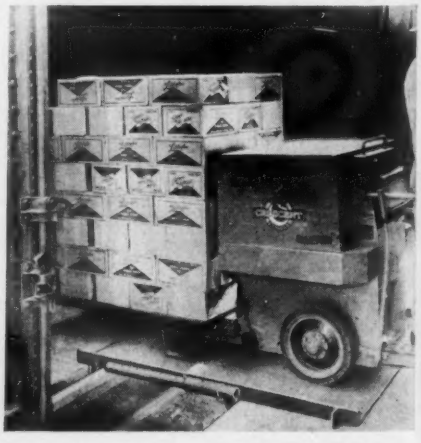
Buda Co., Harvey, Ill. announces two 50-ton hydraulic journal jacks, which have two distinct speeds—a fast speed for quickly raising light or medium-heavy loads, and normal or standard speed for raising capacity loads. Loads are raised by pumping action, lowering being regulated by a control valve.

Model 50-B-12 and 50-B-26 jacks are designed for general high lifting jobs. The former has a closed height of 12 in., a rise of 7 in. and weighs 120 lb; model 50-B-26 has a closed height of 26 in., a rise of 20 in. and weighs 200 lb.

Steel 10/14/46; *Item No.* 9614

Fire Hose

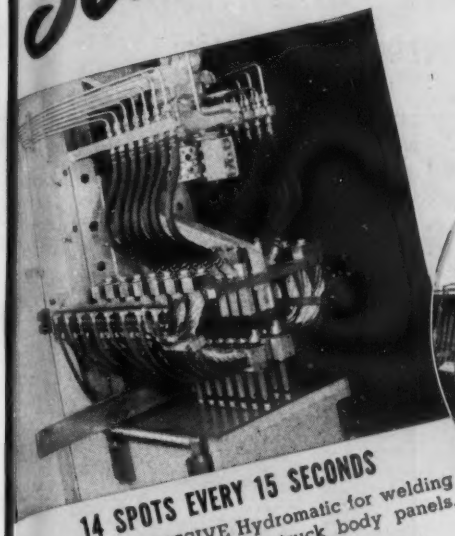
Line of all-weather, water repellent, mildew resistant fire hose built to withstand abrasive action of rough surfaces as well as extremes in temperature is announced by American-LaFrance-Foamite Corp., Elmira, N. Y. Hose is flexible for easy handling and embodies strongly



(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 143.)

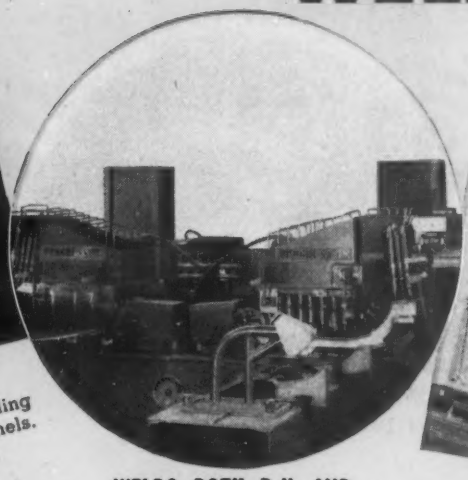
Some reasons why

IT PAYS TO DESIGN for RESISTANCE WELDING



14 SPOTS EVERY 15 SECONDS

Typical PROGRESSIVE Hydromatic for welding 11 gage stake pockets to truck body panels.

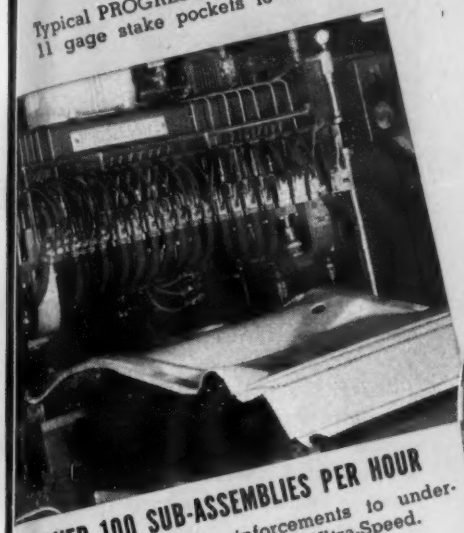


WELDS BOTH R.H. AND L.H. FENDERS AT 175/hr.

PROGRESSIVE Duplex Ultra-Speed welds 18 points on each while the other side is being loaded.

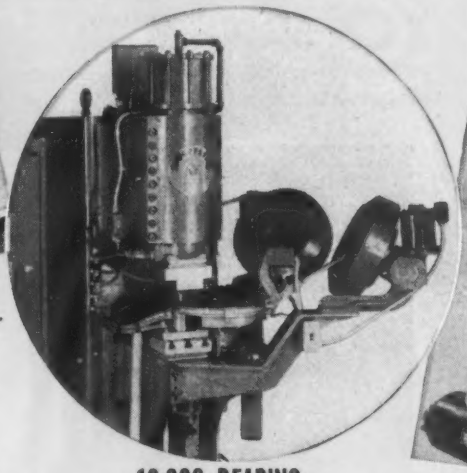
A CABINET DRAWER EVERY 15 SECONDS

Typical PROGRESSIVE Hydromatic assembles drawers for stoves, cabinets, refrigerators, etc., with up to 48 spot welds.



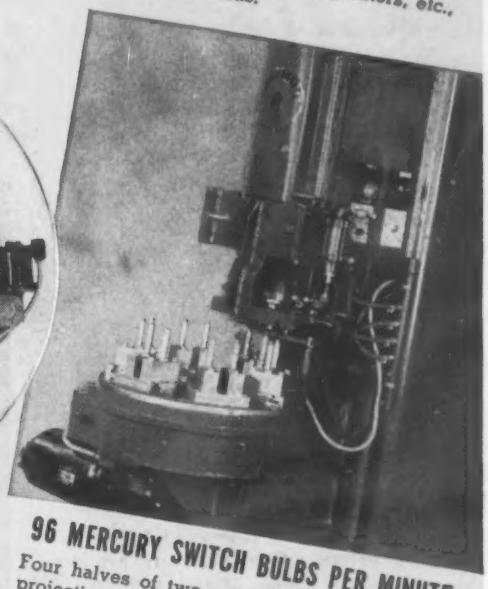
OVER 100 SUB-ASSEMBLIES PER HOUR

Welding cross sill reinforcements to underbodies with a PROGRESSIVE Ultra-Speed.



10,000 BEARING CUPS PER DAY

Automatic loading, feeding, indexing and ejection are built into this PROGRESSIVE Projection Welder.



96 MERCURY SWITCH BULBS PER MINUTE

Four halves of two mercury switch bulbs are projection welded simultaneously on this six-stage dial indexing PROGRESSIVE Press Welder.

"SEE US AT THE METALS SHOW" Booth J-220

IT PAYS TO WELD

For news of the latest developments in resistance welding equipment and methods, influencing product design, ask to be put on the mailing list for the Progressive "WELDING PICTORIAL".

MEMBER RESISTANCE WELDER MANUFACTURERS ASSOCIATION RWMA

PROGRESSIVE Welder Co. 3050 E. OUTER DRIVE • DETROIT 12

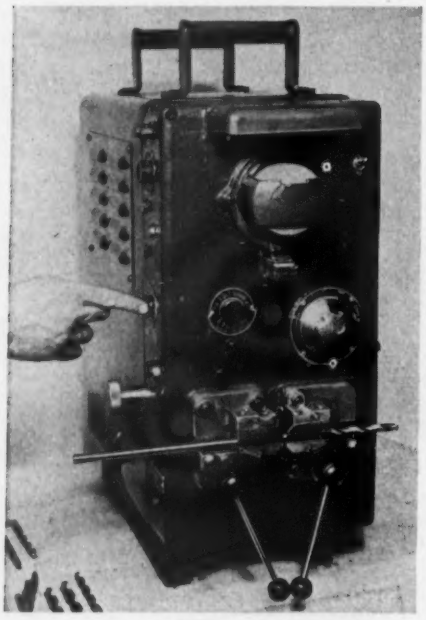
RESISTANCE WELDING EQUIPMENT

reinforced edges of high tension cable cord yarns. It is made for the company by Goodyear Tire & Rubber Co., Akron, O.,

Steel 10/14/46; *Item No.* 9663

Flash Butt Welder

Designed for production welding of bar and round stock up to 5/16-in. diameter, new portable welder, shown here, made by DoAll Co., 1301 Washington avenue South, Minneapolis 4,



is also used for repairing small tools, butt welding tool bit extensions and shanks and joining band saw blades from 1/16 to 1¼-in. wide. Machine is equipped to weld, anneal and flash dress. Fully automatic welding cycle is controlled by single pushbutton switch.

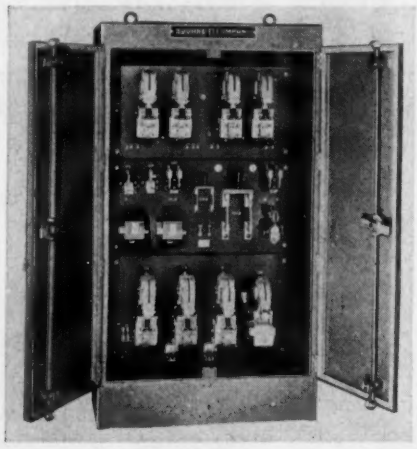
Steel 10/14/46; *Item No.* 9835

Heavy Equipment Control

Industrial Controller Division of Square D Co., 4041 North Richards street, Milwaukee, is introducing a new line of heavy duty direct-current controllers for steel mill auxiliaries, cranes and other heavy duty applications where service is severe. Contactors are available with 8-hour ratings of 100, 150, 300, and 600 amp, and mill ratings of 133 per cent of those values. They have high rupturing capacity and are very rapid in operation.

Pneumatic timers that provide wide range, time limit acceleration unaffected by fluctuations in temperature, voltage and other conditions of application can be mechanically attached to contactors or operated by means of a separate magnet. Control relays are of heavy duty type.

Mill type overload relay combines inverse time thermal overload protection with instantaneous protection in a single

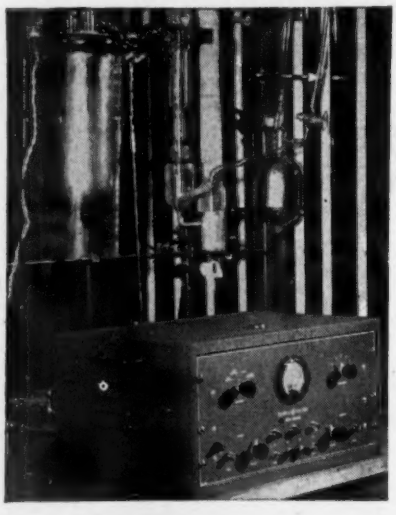


device. Either automatic or remote reset can be obtained by simple reconnection of shunt holding coil. Instantaneous trip setting is indicated on calibrated scale.

Steel 10/14/46; *Item No.* 9685

Ion Gage

An ion gage capable of measuring or monitoring continuously the highest vacuums ordinarily encountered in factory or laboratory processes is announced by General Electric Co., Schenectady, N. Y. Consisting essentially of a control unit and ion gage tube, equipment measures pressures as low as 10-7 mm of mercury



and reads directly in millimeters of mercury.

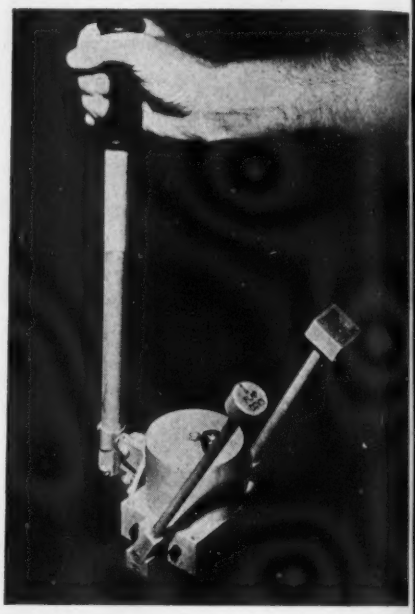
Continuous pressure indication feature permits the detection of small pressure changes and measurement of slow pressure drifts without continual adjustments. A protective circuit is provided to turn off gage tube filament automatically at pressures above 10-4 mm.

Gage control unit includes emission regulator circuit, a stabilized voltage supply, an electronic microammeter with indicating instrument, and filament protective relay. In operation, gage tube is sealed to high-vacuum system and tube is connected electrically to control unit.

Steel 10/14/46; *Item No.* 9556

Hydraulic System

Electrol Inc., Kingston, N. Y., is now producing a hydraulic device known as the Powerpak, which combines in one compact unit a complete hydraulic



system, hand pump, two separate 4-way selector valves, relief valve and reservoir.

Power is supplied by a hand pump, but ports for connecting pressure and suction lines of a power-driven pump are provided. When a power-driven pump is employed, the hand pump can be depended upon for auxiliary use.

Powerpak is extremely light (5 lb), employs standard pipe plugs throughout, and has been designed for simple, inexpensive maintenance. It can supply operating pressures up to 1500 psi and relief valve has settings up to 1750 psi

Steel 10/14/46; *Item No.* 9659

Thermostat

A thermostat capable of controlling temperature of liquids and gases to within plus or minus one-half of 1 degree F is being marketed by Alloy Bellows Engineering Co., Cleveland 12. It has a total range from subzero to plus 250 degrees F and is provided with adjusting

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 143.)

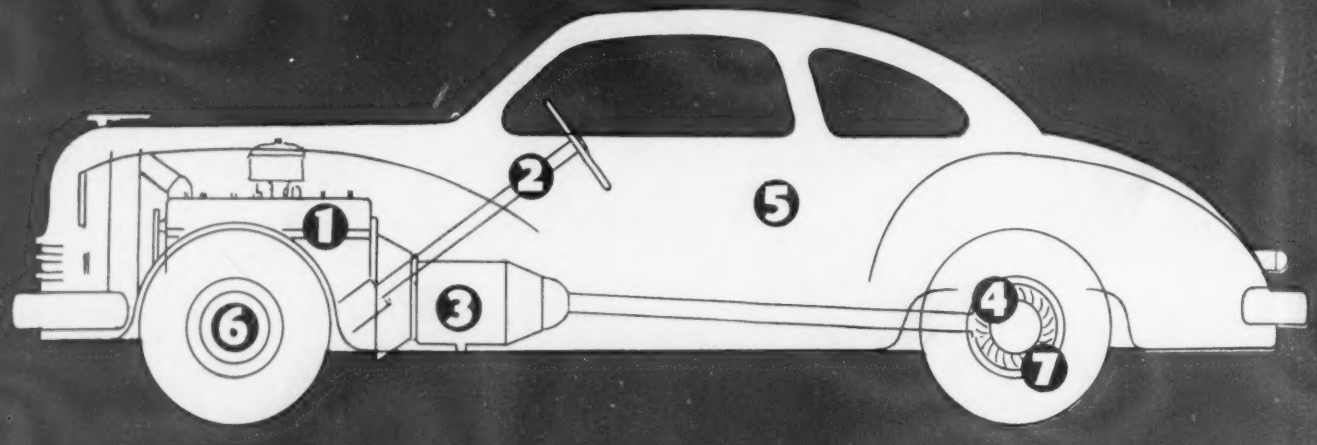
A Toast TO THE AUTOMOTIVE INDUSTRY ON ITS FIFTIETH ANNIVERSARY

for its lasting contribution to the American Way of Life . . . for its perfection of mass production that did so much to hasten victory . . . for its great promise for the future welfare of these United States, which depend so greatly upon its success!

THRU ALL ITS FIFTY YEARS . . . the automotive industry has relied on Houghton metal working products. Today Houghton offers new, proven aids for cold working and heat treating metals, to help make tomorrow's cars even better.

In these many ways Houghton helps

METAL-MEN *of* MOTORDOM



1 **Engine** — For block: HY-TEN Core Oils. For valves, rings, pistons, cylinders, wrist pins, connecting rods: CUT-MAX Cutting Oils, ANTISEP Soluble Oil, Liquid Heats for salt bath heat treating, Quenching Oils, Rust Preventives.

For crankshaft: Pack-hardening Compounds ... Quenching Oils ... Cutting Oils.

2 **Steering Gear Parts** — PERLITON Liquid Carburizer . . . Heat Treating Salts . . . Quenching Oils . . . Cutting Oils.

3 **Transmission** — Cutting Oils . . . Heat Treating Salts . . . Liquid Carburizer . . . Quenching Oils . . . Rust Preventives . . . Cleaners.

4 **Rear End** — Differential, axles: Liquid Carburizer . . . Quenching Oil . . . Cutting Oil . . . Cleaners.

5 **Body** — HOUGHTO-DRAW Drawing Compounds.

6 **Bumpers, Wheels & Hub Caps** — HOUGHTO-DRAW Drawing Compounds.

7 **Brakes & Brakeshoes** — Liquid Carburizers . . . Quenching Oils . . . Cleaners.

Life begins at fifty . . . and Houghton, 81 years young, is ready with new aids to production—developed for metal men of motordom to help them in their efforts to make tomorrow's cars even better.

That help includes not only metal processing products, but that priceless ingredient—personal service—so necessary when molehills grow to mountains.

If the problems facing you involve carburizing, heat treating, metal cutting, forming, cleaning, lubrication, rust prevention or allied applications, Houghton experience over these many years is available.

The representative who calls on you is the shirt-sleeve type, ready to work out in your plant when a new situation arises which requires experimentation to perfect a process. Behind him is a trained technical staff traveling out of our main offices—also complete laboratory facilities for testing and control work. Ask for his help.

E. F. HOUGHTON & CO.

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Sales and service in all principal cities

ng knob located with 30-degree adjustng range.

Body of instrument is cast, and rod and tube thermal element and stainless steel pivot pins are accurately machined for precision operation. Electric contacts are snap acting and can be supplied with single pole, single throw with contacts normally open or closed or single pole double throw. Capacity is 10 amp. Thermal element is 16 in. long.

Steel 10/14/46; *Item No.* 9623

Electronic Micrometers

Carson Micrometer Corp., Newark, N. J. is producing four electronic micrometers for precise thickness measurement in the shop or laboratory featuring an electronic circuit used in conjunction with micrometer screw thread.

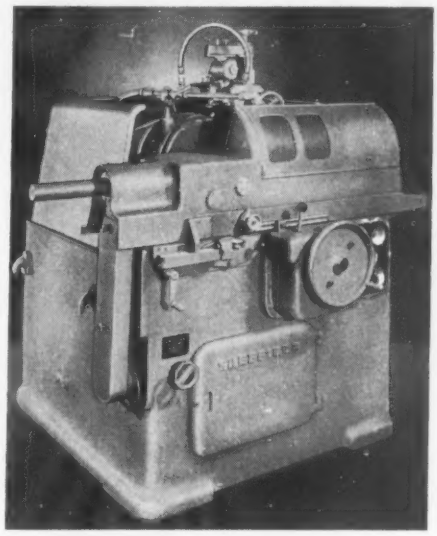
Instruments measure thickness of compressible or noncompressible materials as well as conducting or nonconducting materials. Unskilled operators are assured of consistently accurate readings to 0.00005-in. Precision is unaffected by variations in temperature, line-voltage, vibration or aging of electronic tubes, and leveling is not required.

Steel 10/14/46; *Item No.* 9708

Annular Form Grinder

Precision annular form grinder announced by Sheffield Corp., Dayton, O. utilizes the "Crushtrue" principle of wheel dressing for rapid production of annular and cylindrical forms such as circular form tools, crusher rolls, ball bearing seals, seaming rolls, and other similar forms of intricate and precise profile.

A variable speed gear head motor drives the work head spindle in either direction through pulleys and two V-belts over a spline shaft required for table positioning. Work head spindle may be of either live or dead center construction while live center has provision for manual collet closing, maximum collet size 0.6875-in. Sandard work speed



range is 60 to 360 rpm and may be varied in infinite increments.

A hand crank is used for table positioning. Adjustment knob provides micrometer control of the table position, and a table lock prevents shifting of work with respect to the wheel during the work cycle.

Steel 10/14/46; *Item No.* 9763

Asbestos Gloves

Line of asbestos gloves and mittens, made by Safety Clothing & Equipment Co., 7016 Euclid avenue, Cleveland 3, and known as Gardwell, features a specially designed thumb arrangement on leather reinforced styles. Leather reinforcement completely covers thumb at points of hardest wear, greatly strengthening thumb of both glove and mitten.

Gloves and mittens with leather reinforced palm and thumb, or palm fingers and thumb are suitable for heavy duty work, especially in handling hot metals with sharp edges. All styles are available in any lengths with or without lining.

Steel 10/14/46; *Item No.* 9610

Remote Switch Control

New remote switch control unit combining an electrical switch and flexible control to allow for remote switch operation has been placed on the market by Arens Controls Inc., 2253 South Halsted street, Chicago 8. It is adaptable to all types of small machine tools and may be installed so that the operator with body pressure against the switch button can turn the machine off without removing his hands from the work.

Control head may be mounted by means of a 3/8-in. hole through a panel. Switch box includes a 10-amp switch and is constructed of cast aluminum with a metal cover and threaded boss to take the standard 1/2-in. circuit.

Steel 10/14/46; *Item No.* 9673

Torque Wrench

Jo Mfg. Co., South Gate, Calif., is announcing a T-handle heavy duty torque wrench which has a range to 90 ft lb and is equipped with needle bearings to eliminate friction. Break comes by automatic impulse when predetermined torque has been reached.

All torque control features are metal encased to stand up under shop usage. The wrench is 10 in. long over all, 3½-in. high, has a ½-in. square drive.

Steel 10/14/46; *Item No.* 9662

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

Circle numbers below corresponding to those of items in which you are interested:

9855	9663	9623
9858	9835	9708
9856	9685	9763
9857	9556	9610
9854	9659	9673
9614		9662

10-14-46

NAME ..... TITLE .....

COMPANY .....

PRODUCTS MADE .....

STREET .....

CITY and ZONE ..... STATE .....

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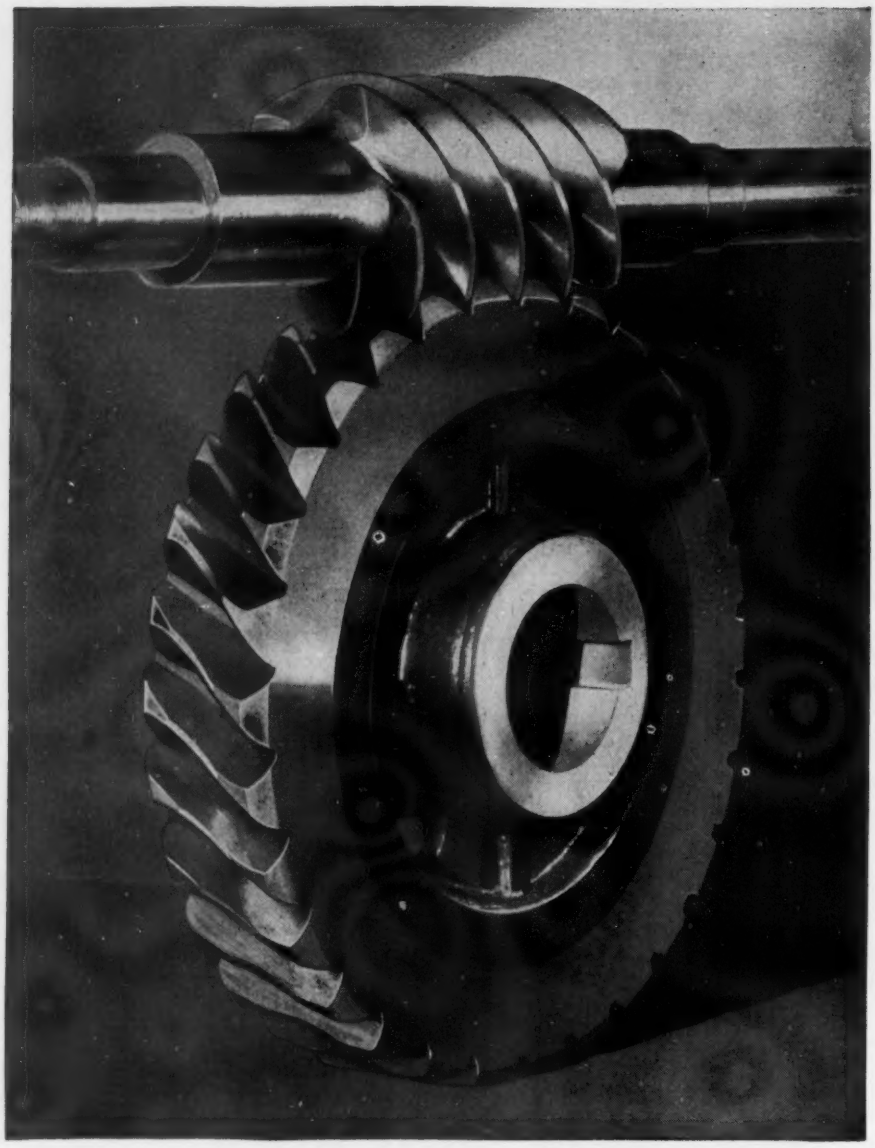

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Modern Metal Protection

(*Continued from Page* 109)

A nonsacrificial coating, for example copper or nickel, also forms a galvanic cell with iron but the current set up has the opposite direction to that generated by a "sacrificial coating". Currents from these cells serve to increase corrosion of the base metals. Since electrolytic action can occur only at breaks in the coating, it is obvious that coatings of the nonsacrificial kind must be free of pores in order to have optimum protective value. This condition is usually approached in a coating sufficiently thick.

Increasing use is made of sacrificial coatings on alloys of aluminum such as Duralumin which contains about 4 per cent copper. By bonding it metallurgically with pure aluminum, the rolled sheet presents a surface of pure metal of intrinsically better corrosion resistance than the underlying stronger alloy. Should a corrosion pit form in the outer coating its progress is altered on reaching the alloy layer so that the pit broadens rather than penetrates the sheet. This desirable behavior of duplex aluminum layers results from the fact that pure aluminum is anodic to and hence protects the copper-aluminum alloys in the same way that zinc protects iron.

Aluminum coatings on steel have appeared on the market offering a material with improved high temperature oxidation resistance. Their porosity at elevated temperatures is not of great consequence because aluminum readily diffuses into areas partially coated, or the oxide soon fills the pores. Used for fresh water exposure at ordinary temperatures these coatings must be essentially pore free to be protective because aluminum is cathodic to iron.

In salt water, however, aluminum reverses its potential in respect to iron and acts as a sacrificial coating, protecting iron galvanically at any break in the coating. Cadmium and lead are further examples of metals that reverse their galvanic behavior with respect to iron in certain environments. Another example is the tin coating on iron, being noble to iron on the outside of tin cans, but less noble than iron on the inside where oxygen concentration is low.

These examples serve to emphasize the fact that the electromotive series has limited general utility and is not a reliable index for predicting the galvanic behavior of metal couples in all media.

Organic Coatings: Organic coatings, including laquers and paints, serve largely to isolate the metal from its environment, and are effective on iron to the extent that they limit diffusion of both

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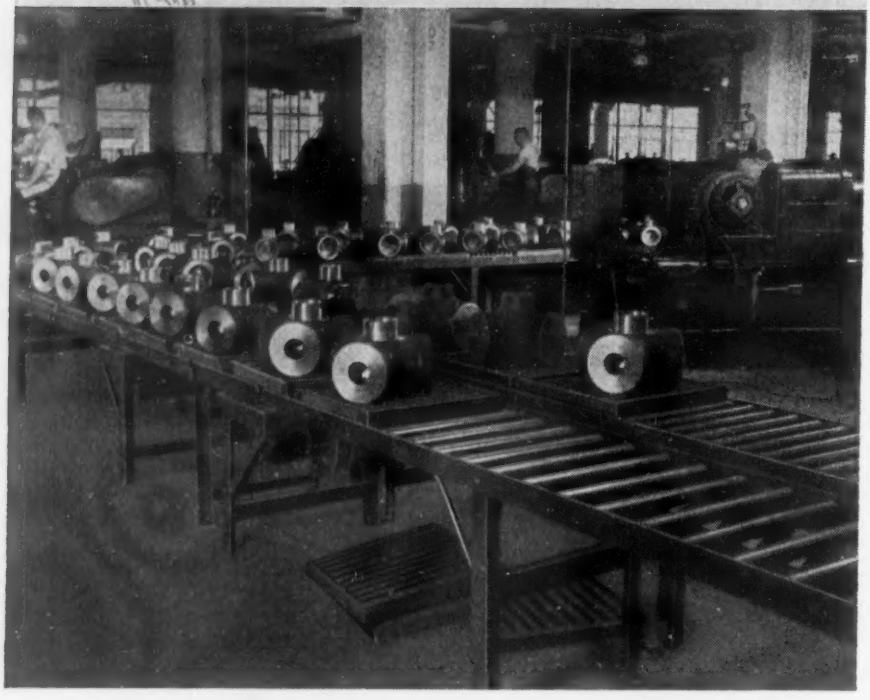

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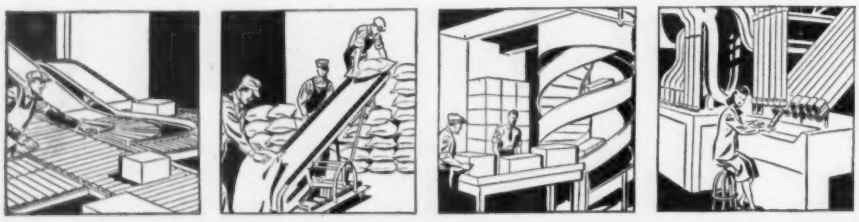

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moisture and oxygen. As electrically insulating coatings, they are being used today in conjunction with cathodic protection as a means for reducing the required current, and reducing the care required in the careful spacing of anodes when the cathode is not coated. With any break in the organic coating a current immediately flows to that area and protects the exposed metal. Modern paint systems incorporate corrosion inhibitors in the paint coating next to the metal.

Inhibitors and Passivators: Inhibitors such as used in the pickling of steel, appear to function by adsorbing on the metal surface forming a tightly bound monomolecular film or monolayer of ions. The passivators, on the other hand, appear to function by another mechanism. They apparently adsorb more strongly, characteristic of activated adsorbtion, and satisfy secondary valence forces of the surface, such that the surface metal atoms no longer have the same tendency to leave the lattice and enter into chemical reaction, thus accounting for the lower corrosion rate. Passivators are characteristically oxidizing compounds; the type of adsorbed monolayer formed by chromateions is illustrated in Fig. 4.

The organic type inhibitors are now being added to oils and greases used for the protection of surfaces of iron from finger printing and accidental rusting during handling or shipping. Recently a volatile organic inhibitor has been porduced which fills the air space of packaged steel parts and continuously supplies a protective atmosphere.

Corrosion Products Coatings: The phosphate and oxide coatings on iron, produced by controlled chemical reaction with the metal, are an example of passivation attended by corrosion-product formation on the metal surface. These types of coatings, illustrated in Fig. 5, when applied to iron, afford of themselves only slight protection because of their inherent porosity. Phosphate coatings, however, serve as an excellent base for paints and aid in the protection that paints provide. Oxide coatings likewise have been found to offer a good structure for the retention of oil or wax on the surface and are corrision protective when so used.

Alteration of the Environment: For industries using large volumes of water, deaeration is an economical practice to reduce the corosion rate of boilers and rusting of iron equipment by diminishing the concentration of dissolved oxygen. For high pressure steam plants, the oxygen concentration must be particularly low, usually less than 0.005

GRIND thread rolling dies?

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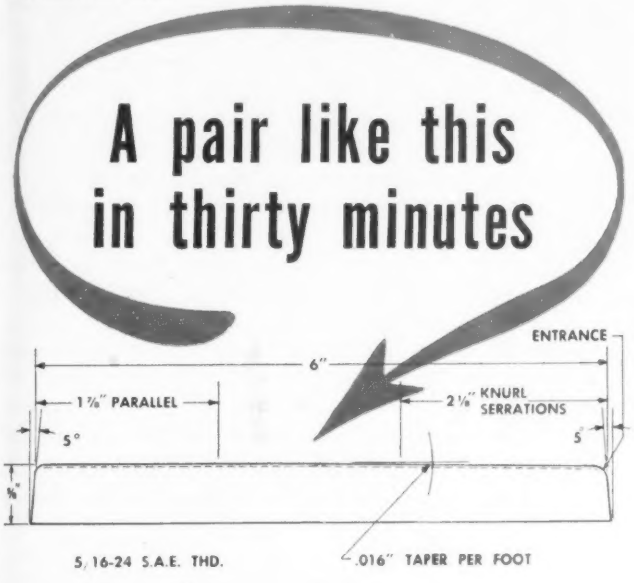
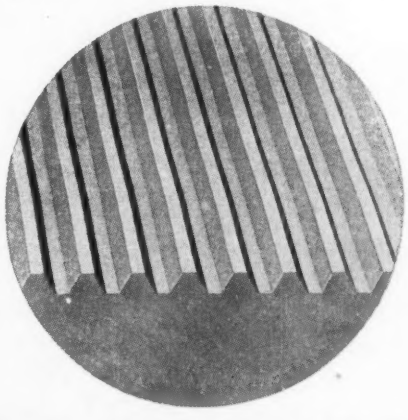
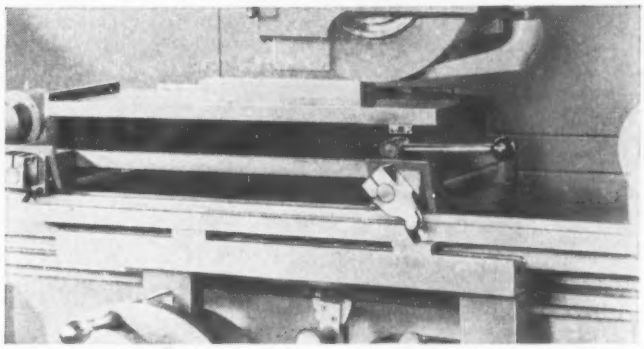
Now—through a new application of THOMPSON TRUFORMING—you can produce accurate duplicate roll thread dies and eliminate subsequent corrective operations formerly required. An example is the roll thread die shown here.



This is the Stationary Die (a perfect mate to the Moving Die not shown). Both were ground on a THOMPSON TRUFORM grinder from heat-treated alloy steel in less than thirty minutes. Note the radii, the precise taper and flat section. This is produced with a single cut—to full depth of thread form without resetting.



Enlarged tooth section shows form of threads and helix angle. By TRUFORMING dies are perfectly matched . . . there is no distortion.



Deformities are eliminated by TRUFORMING because work is finished right in hardened steel. Note the special forming fixture in the photograph, which makes possible completely automatic and highly accurate grinding of the longitudinal contour. These Thompson die grinding features are new with patents applied for.

Longer die life and greater die accuracy, plus ability to regrind dies without drawing, are three great advantages you get with this THOMPSON TRUFORMING application.

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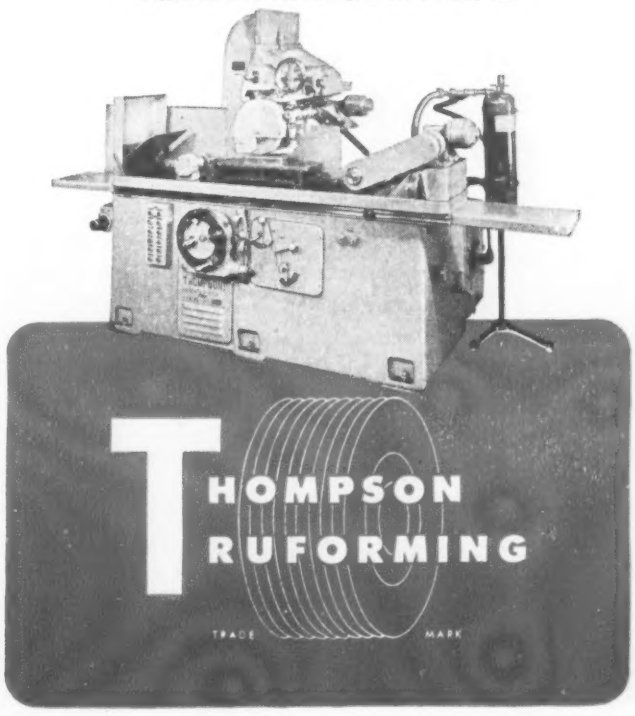

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ppm. Modern deaerators can achieve this degree of removal, but, should traces of gas remain, the oxygen can be eliminated by addition of sodium sulphite.

In cold water processes the dissolved oxygen should be reduced to at least 0.3 ppm. Cold water deaerators are now available to achieve this degree of oxygen removal or better. Water is sprayed into an evacuated chamber and dissolved gases removed without heating the water above 5° C (40°F). Deaeration, as carried out in modern deaerators, also reduces the dissolved CO_2 content of boiler water and thereby decreases the corrosion rate of steel lines carrying steam condensate.

Metal Purification: Purification of a metal, to remove cathodic elements of galvanic cells entering the corrosion reaction, has successfully improved the corrosion resistance of aluminum and magnesium. This approach to corrosion control has not been too fruitful for iron, because the corrosion of iron largely depends on the amount of oxygen reaching cathodic areas of the metal. The cathodic areas of iron are not necessarily limited to impurities but may be portions of the metal surface itself which shift from place to place as corrosion continues and as aeration and other conditions change. For magnesium, impurities constitute most of the cathodic areas, and purification therefore, has to a large degree improved the corrosion resistance.

Alloying for Chemical Resistance: Alloying, including surface impregnation, is one of the most effective means of improving both physical and chemical properties of metals. Surface coatings of silicon-iron alloy produced by reaction of $SiCl_4$ with iron are effective in reducing galling of rubbing surfaces as well as considerably improving the resistance of iron to many mineral acids. The surface alloy so produced is similar to the commercial 14 per cent silicon-iron alloys used as corrosion resistant castings for equipment in the chemical industry.

The passivity mechanism of the stainless steels, which accounts for outstanding corrosion resistance, is generally ascribed to a very thin, continuous, highly protective film of metal oxide such as Cr_2O_3. Alloying has also been of great value in the development of metals to withstand high temperatures. Chromium is present in all structural alloys that are designed to withstand high temperature oxidation. Other alloying elements useful for high temperature oxidation resistance are aluminum, nickel, cobalt, and, to some extent, silicon. The action of these elements in all but the lower range of temperatures is related

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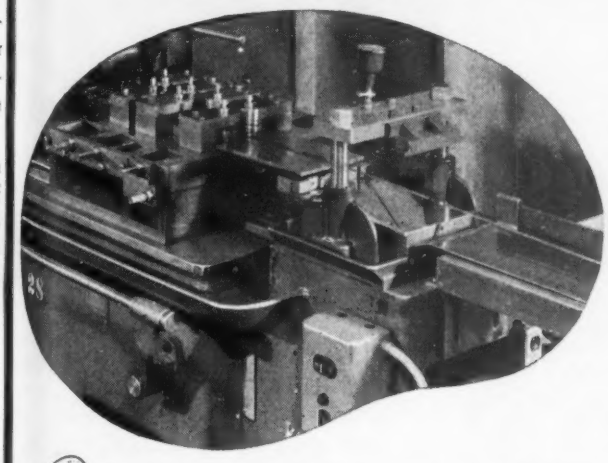

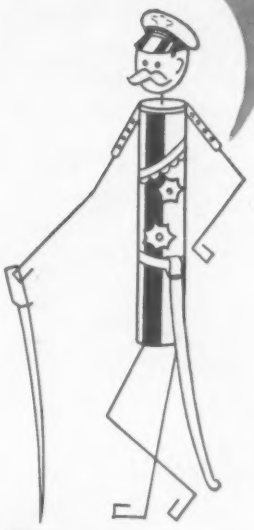

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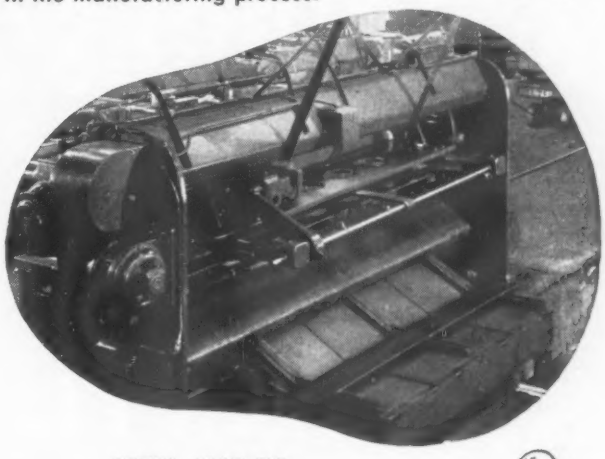

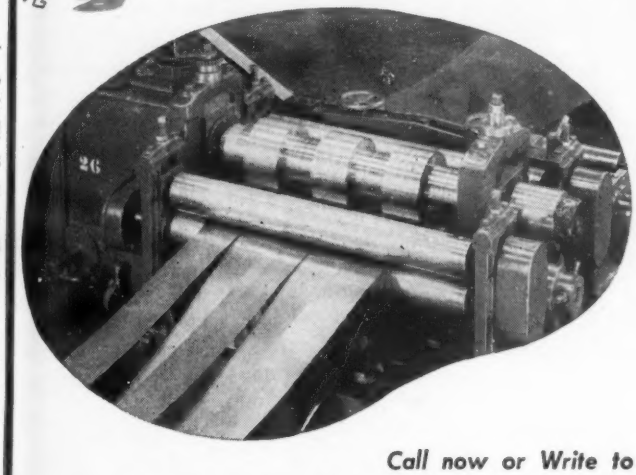

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largely to their effect on properties of the oxide coating.

It is likely that the theories of corrosion have been too closely allied with physical barrier films and coatings as the mechanism of corrosion control. Such films are extremely important in accounting for the low basic corrosion rates of many chemically active metals, but the hypothesis that they account for practically all corrosion resistance is not correct.

It is a mistake, therefore, to promote the viewpoint that corrosion investigations in general can eventually be simplified to the point where study of the protective film is all that is required. Actually the metal and its structure are inherent factors in the corrosion process whether or not physically protective films form on the metal surface. It is probable that this aspect of the problem will receive increased attention in the next phase of fundamental corrosion research.

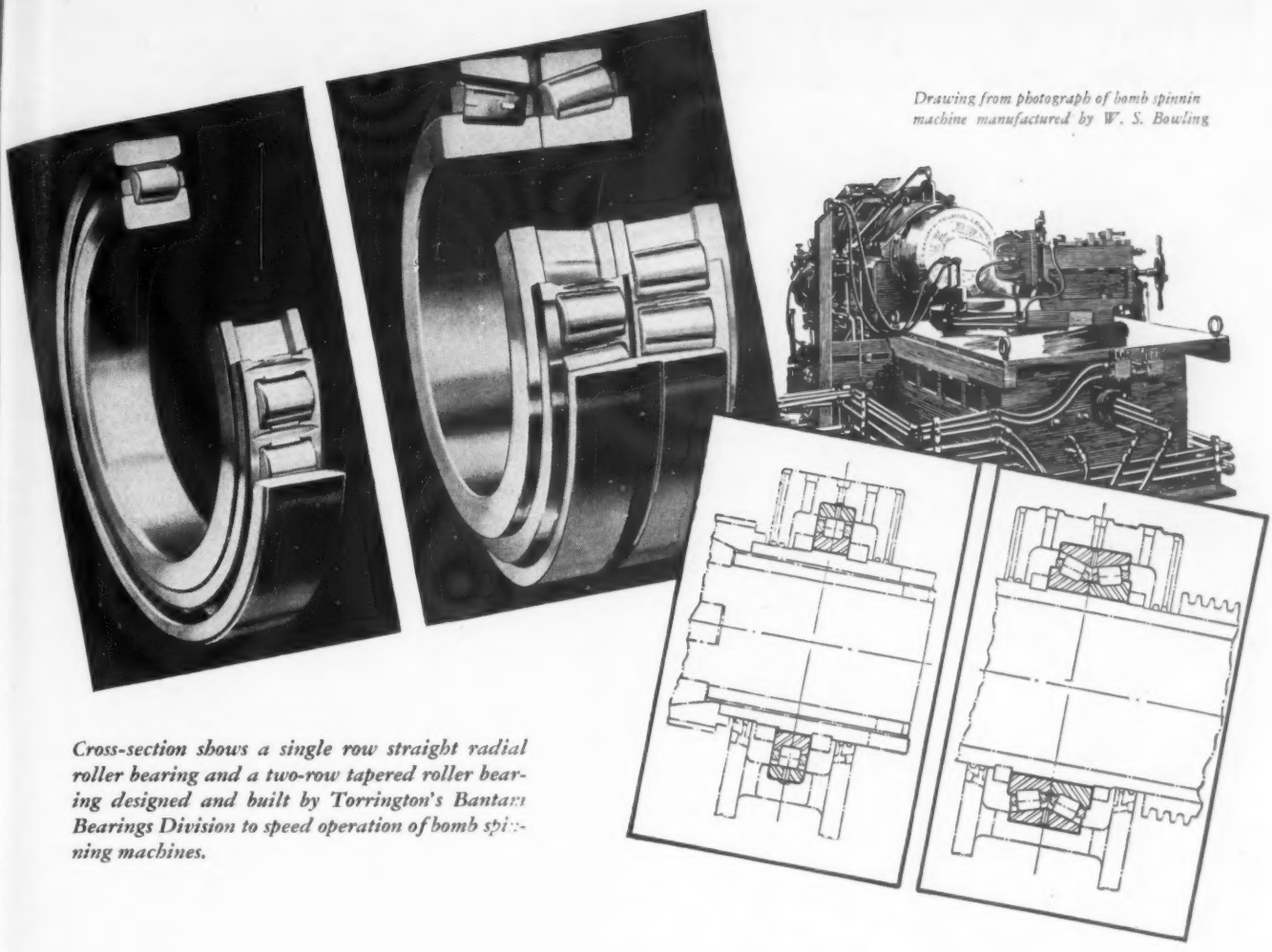
PLASTIC COATINGS TO CONTROL METAL CORROSION

From Paper by S. P. Wilson,
Cleveland Varnish Products Co.,
Cleveland

Although there are hundreds of polymerized and polymerizable chemicals falling under the heading of plastic products which may be used as protective coatings, they may be classified under two main headings. These are the "thermosetting," or heat hardening types on the one hand and the "thermoplastic," or heat and pressure softenable materials on the other. A few materials are border line cases, acting as members of both groups. The thermoplastic materials are as a rule completely polymerized as made, and are deposited from solution or suspension without further chemical change being involved. The thermosetting products are used in a partially converted condition, the final curing to an insoluble, infusible, corrosion resistant film being obtained after application by baking.

The oldest member of the thermosetting group is the condensation product of phenol and formaldehyde. When this reaction is carried to its limit, an insoluble, infusible, resin results, which is very useful as a structural material but not as coating. The reaction can be interrupted, however, at a point where the resin is soluble in alcohol and this can be applied to a surface on which the final conversion can be achieved. The converted film rates very high in regard to corrosion resistance against a wide array of materials.

One U. S. Navy specification for such a product requires resistance for 5000 hours to such individual tests as moving sea-water, hot oil at 200° F, water at



Drawing from photograph of bomb spinnin machine manufactured by W. S. Bowling

Cross-section shows a single row straight radial roller bearing and a two-row tapered roller bearing designed and built by Torrington's Bantam Bearings Division to speed operation of bomb spinning machines.

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On the typical Torrington Bearing equipped spindle, the heavy alternate radial and thrust loads on the fixed end of the spindle are carried by a rugged, compact double row tapered roller bearing. A single row straight radial roller bearing supports the floating end of the spindle, allowing lineal expansion to take place without cramping. Special design features at the pocket corners of the bearing cage take care of the rapid alternation between radial and thrust load. A specially designed automatic controlled oil lubrication system handles the excessive heat generated by the unusual operating conditions.

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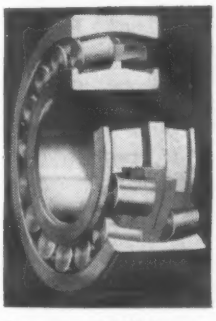

This latest addition to the Torrington line is a self-aligning bearing, specifically adaptable for heavy-duty performance. Sizes will be available to cover a complete range from 1.5748" bore and up. Write for Bulletin 200 or see your nearest Torrington Representative.

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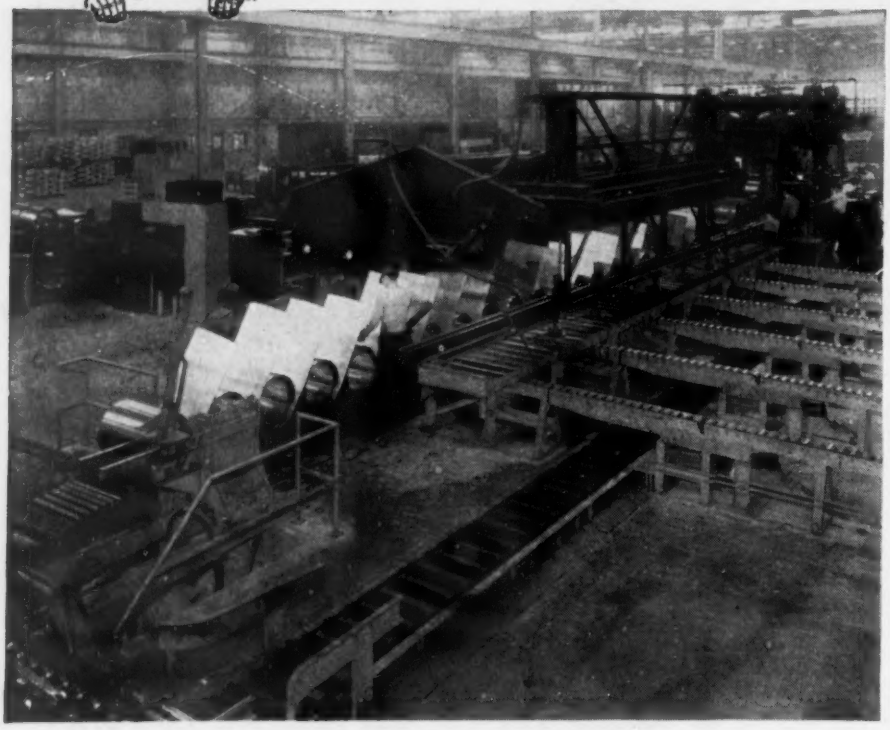

EVERY manufacturer, in striving to keep costs at a minimum, must deal with more or less difficult material handling problems. These are not always quickly solved, and usually require considerable thought by plant and conveyer engineers. Most experienced plant engineers agree that the use of Mathews methods and Mathews equipment means efficient material handling. That is why Mathews Engineers are usually called in on the problem requiring special attention. There are many types of Mathews Conveyers of both gravity and power designs, and from these types are selected the units which make up Mathews continuous flow conveyer systems. It is with such systems that prominent manufacturers are reducing worker fatigue and keeping materials moving through processing machinery, storage and shipping, with a minimum of product re-handling, costly confusion and delay.

It might be that a Mathews Engineer can show you what others in your industry have done to improve their material handling. We will welcome your inquiry and give it prompt and thorough service.

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212° F, acetone, alcohol, gasoline, and toluol. It also required adhesion without film rupture if heated to 450° F for 10 hours or kept at 50° F for 100 hours. This type of coating is usually applied by dip or spray from an alcoholic solution at from 20-30 per cent solids, giving a dry film of 0.5-0.75 mil thickness. A good average baking schedule for one coat is 325° F for 40 min. For some objects, notably metal pipe, the use of induction heating and dip coats makes possible continuous rapid coating—the bake being shortened to around 5 min. Pipe so coated has been given field tests of 4-6 years inside and 675° F outside have stood up 3 years satisfactorily.

One of the drawbacks to the phenol-formaldehyde type of finish is its deep amber color which precludes the manufacture of white or pastel colors. Where the decorative element is important, and where chemical resistance need not reach the maximum level, another group of thermoplastic products becomes of prime industrial value. These are the amine-formaldehyde resins, condensation products of formaldehyde and amino compounds such as urea or melamine. Condensed with higher alcohols such as butyl or capryl, water white resins are obtained which are soluble in aromatics and heat convertible to a colorless film. If used alone, films of great hardness but poor adhesion and gloss are obtained, so they are usually modified with drying or non-drying alkyd resins or other plasticizers. The chemical resistance is usually diminished by these additions, but the improvement in other factors warrants this in most of their applications.

These resins appear in most home appliances, such as refrigerators, washers, steel kitchen cabinets, fluorescent fixtures, etc. They afford a complete choice of color, particularly nonyellowing whites, give hard, tough, durable films at bakes as short as 1 min at 400° F on thin steel, of 3-6 min under infra-red on regular production. Their chemical resistance is high against humidity, fruit acids, mild alkalis and detergents, and fats and oils. They are flexible enough to permit coating steel strip and winding in coils for making venetian blind slats. Industrially they are of prime importance, and as of today offer perhaps the best choice for finishing mass production steel articles to be used in ordinary environments.

Thermoplastic resins are far more numerous than the thermosetting. They can be broadly separated into a few classes. Two most important are cellulosic and vinyloid divisions, in each of which many sub-divisions of chemical individuals and copolymers exist. These materials are all high polymers, either natural as in the cellulose compounds, or artificial as in the vinyloid series. The

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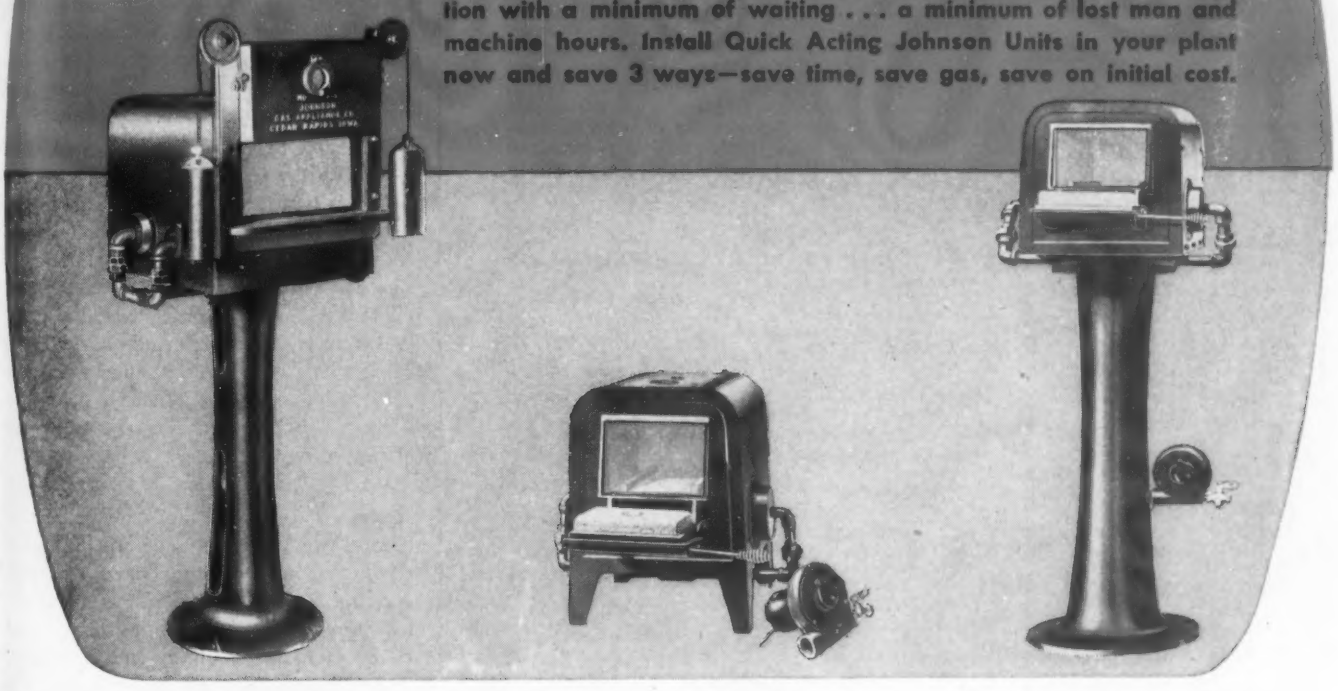

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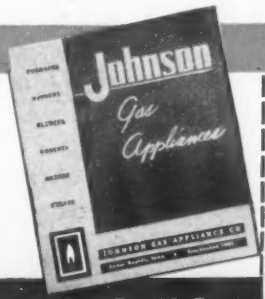

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Handling conditions vary for each particular plant. Your own problem should be presented to an experienced material handling engineer. However, the following example outlines a simple method for determining the savings possible with an electric industrial truck. Let us assume a hypothetical plant with the simple problem of transporting daily 180 tons of material 200 feet from stockrooms to processing machines. Without power trucks this would require 10 truckers, each making 10 round trips per hour, or 80 trips per day, carrying 450 lbs. of material per load.

TABLE I—*Handling Costs Without Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (85¢ per hour)	$68.00	$0.378
Social Security Taxes	2.72	0.015
Workmen's Compensation	1.00	0.006
Hand Truck Depreciation	0.30	0.002
Total	$72.02	$0.401

In order to mechanize handling operations, the following equipment would be required:

TABLE II—*Cost of Equipment for Mechanizing*

Fork Lift Truck 2000-lb. capacity	$4,100.00
Battery	600.00
Charging Equipment	840.00
200 pallets	700.00
Total	$6,240.00

The truck, handling one-ton pallet loads of material, making 24 round trips per hour, could transport the 180 tons in 7½ hours.

TABLE III—*Annual Expense—Truck Operation*

Depreciation—Truck at 10%	$410.00
Battery at 20%	120.00
Charging equipment at 6⅔%	56.00
Pallets at 20%	140.00
Tires	100.00
Repair and Maintenance—Truck	164.00
Battery	24.00
Charging Equipment	33.60
Replacement of damaged pallets	70.00
Electricity	82.00
Insurance	10.00
Total annual expense	$1,209.60
Expense per day	4.03

TABLE IV—*Handling Costs—With Electric Truck*

Based on 180 tons per day	*Cost per day*	*Cost per ton*
Labor (Driver—$1 per hour)	$8.00	$0.044
Social Security Taxes	0.32	0.002
Workmen's Compensation	0.16	0.001
Truck Expense	4.03	0.022
Total	$12.51	$0.069

TABLE V—*Savings With Electric Truck*

Savings Per Ton	$ 0.332
Savings Per Day (Handling 180 tons)	59.51
Savings Per Year (300 days)	17,853.00
Per Cent Reduction in handling costs	83%
Annual earnings on investment	286%

While this example is obviously oversimplified, Baker Material Handling Engineers are prepared to show you how similar savings can be made on handling operations in your plant.

COST OF MATERIAL HANDLING

Per ton—based on 180 tons per day

In addition to these savings, Baker Trucks reduce warehouse rental charges by tiering, contribute to plant safety, speed production and material movement, and perform many other operations that reduce plant overhead.

BAKER INDUSTRIAL TRUCK DIVISION *of The Baker-Raulang Company*
2167 WEST 25TH STREET • CLEVELAND, OHIO
In Canada: Railway and Power Engineering Corporation, Ltd.

coating consists of a solution or suspension of these high polymers and application by dip, spray, rollercoat or other means supplies a film for which an air dry or low bake to remove solvents is adequate.

Among the cellulosic plastics the oldest and most important are the nitrocellulose type lacquers, of which many millions of gallons are used annually in finishing metal articles ranging from automobiles to glove buttons. Nitrocellulose, with its modifying resins, plasticizers, and stabilizers, is soluble in a wide range of organic solvents. It may be colored with dyes or pigments to any desired effect or used clear as a coat for silver, brass, or copper to resist tarnish. It dries in the air at room temperature faster and more completely than any other industrial finish and gives protection against ordinary environments to a degree adequate for such important products as automobiles.

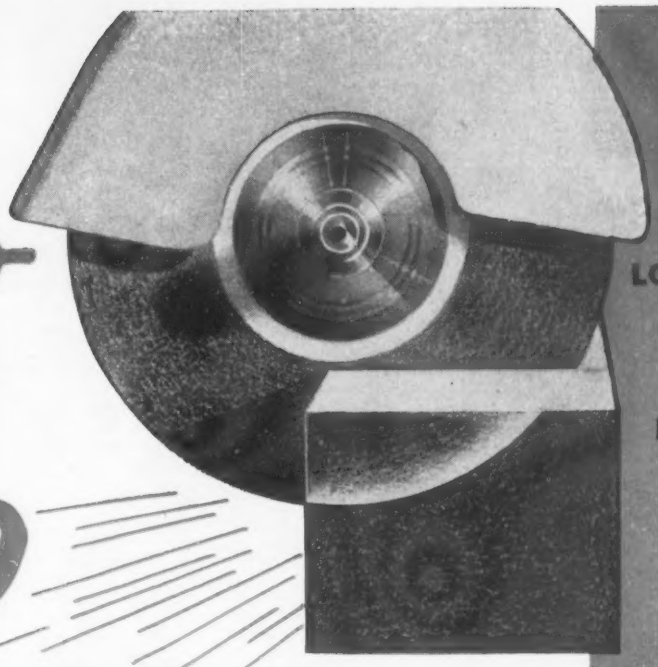
Adhesion to clean metal is good, and is bettered by suitable primers. The nitrocellulose type materials are valuable for industrial finishing where chemical resistance requirements are moderate, production requirements high, baking facilities undesirable or unavailable, and decorative requirements of importance. These along with the amine-resin finishes, previously noted, are the two most important industrial finishing coating types at present employed.

The most widely used vinyloid, for protective coatings, is the vinyl chloride-acetate copolymer. In general, the higher the molecular weight of these materials and the higher the chloride percentage, the greater the chemical resistance, and the poorer the solubility and adhesion. The solutions run to the viscous side and high concentrations with suitable viscosity for spray or roller application were not available until recently.

This was brought about by a process of dispersing these resins as organosols in nonsolvents, in which condition they may be applied at solids contents of 50 per cent or higher, and the aggregation of small particles left as the solvent dries can be flash baked to cause fusion to a smooth, coherent film. In the future, this principle may find application to the still less soluble and more resistant resins now beginning to appear. In general, the chemical resistance of the vinyl coatings is very high. Much of this plastic is applied to sheet metal by rolling, the metal being later shaped into its final form.

The allyl phthalate resin coatings form a link between the thermosetting alkyds and the thermoplastic vinyls, in that the film when baked to its upper limit loses thermoplasticity and becomes a very hard, adhesive, and chemically resistant coating. The chief potential use may be in

Electro HIGH SPEED CUT-OFF WHEELS



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BAKER, 314-A. Universal quick change type heavy duty drill, arranged with multiple head and work holding fixture. This machine is furnished with BAKER flange quill spindle construction for more rigid and better applications of the multiple head to the machine.

Being a typical BAKER quick change artist, this machine can be readily changed to a single spindle type by the furnishing of a new spindle assembly. This results in a flexible, fuller, universal single spindle, heavy duty drill with six instantaneous changes of speed and quick change of feed. All controls are convenient to the operator in his normal position. Reversing type controller is also furnished which allows for handling tapping operations. ALL BAKER, geared feed heavy duty drills can be furnished with positive thread lead attachment, giving positive lead to taps. Greater life of taps and more accurate tapped holes are thus assured.

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TOLEDO, OHIO, U.S.A.

can linings but as more users become familiar with this recently developed polymer coating further expansion of its field is probable. Also of recent development are two resins based on ethylene; polymerized ethylene, known as polyethylene, and the polymer of tetrafluoroethylene. Polyethylene has extraordinarily high chemical and moisture resistance. Tetrafluoro-ethylene is reported to be stable at temperatures around 500° F and to be resistant to all chemicals and solvents.

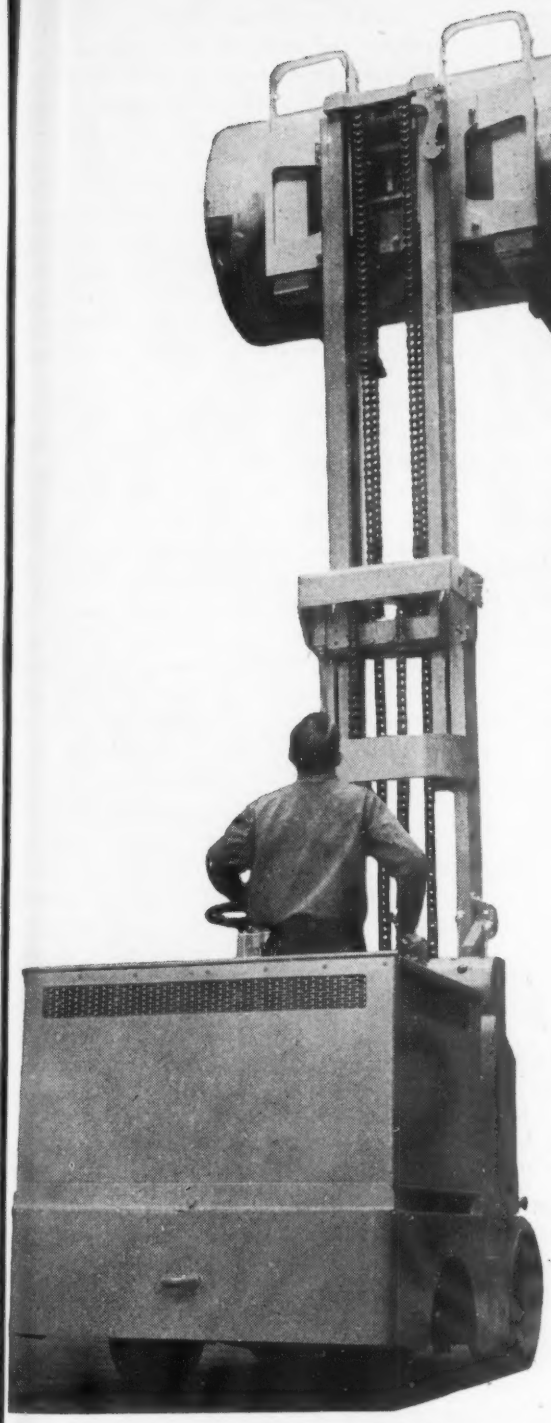
Coatings produced from the silicones, which are derived from silicon linked to carbon complexes, and classed as a member of the thermosetting resin family, are reported to have unusual temperature stability and good chemical resistance. Coatings produced from silicones pigmented with titanium oxide give a white coating which is unchanged at temperatures above 400° F at which the best melamine alkyd products are appreciably discolored.

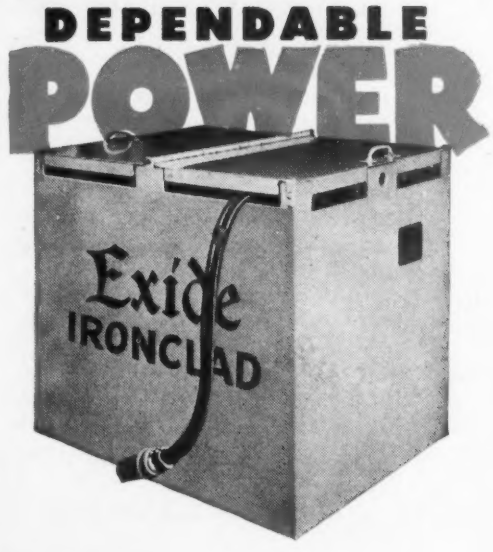
CLAD STEEL PROCESSING EQUIPMENT FOR CHEMICAL AND ALLIED INDUSTRIES

From Paper by
E. C. Gosnell
Colonial Iron Works,
Cleveland

Clad steels are very desirable for the fabrication of large corrosion resistant processing equipment, particularly if designed for pressure or vacuum in which it is necessary to use appreciable thicknesses of material for physical requirements. Clad steels, in plate thicknesses of 3/16-in. or over, are generally used. With lighter gages of clad steel, extreme care in welding is necessary and there is less saving in comparison with solid sheet materials. The use of clad steels may also make possible the purchase of corrosion resistant equipment which would be prohibitive in cost if fabricated of solid corrosion resistant materials.

Following clad steels are commercially available in the form of plate and heads: Nickel clad steel, Monel clad steel, Inconel clad steel, stainless clad steel, silver clad steel, and chrome steel clad. The following clad steels which have been produced in smaller quantities are not at present commercially available: Everdur clad steel, 70-30 cupro-nickel clad steel, copper clad steel. Some experimental work has also been carried out on Hastelloy B clad steel; however, this clad material has never been marketed. Clad steels are available in plate up to 162 in. in width and 480 in. length, however, maximum not in all gages. Heads are also available of one plate construction up to approximately 12 ft in diameter, however, maximum diameter not in all gages.





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Exide-Ironclad Batteries are specially designed and ruggedly built to meet the increased service requirements of the modern electric industrial truck . . . the efficient, time-saving, cost-cutting method of materials handling.

Exide-Ironclads have the *high power ability* needed for frequent "stop and go" service. Their *high maintained voltage* throughout discharge assures a uniform rate of operations in handling light or heavy loads. Their *high capacity* provides full shift availability, and their *high electrical efficiency* keeps power costs at a minimum. For dependability, safety, long-life and ease of maintenance, you can always count on Exide-Ironclad Batteries.

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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 52
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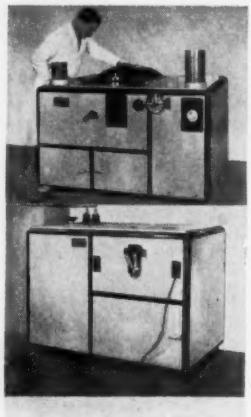

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Clad materials have their range of usefulness and may not be suitable for all parts of equipment. This is illustrated in Fig. 5, which shows fabricated flaking equipment for caustic. The troughs are of 20 per cent nickel clad steel and the drum was cast of nickel cast iron. Since the drum had to be machined for true surface, it would be very difficult to roll such a cylindrical shell of sufficiently low tolerances on diameter to permit machining without removal of all or part of the nickel of the clad plate and thus expose steel. This drum could have been fabricated by welding solid nickel but such construction was considered too costly by the customers. Thus clad steel and castings were incorporated in the design of this equipment.

Most plant processing equipment using clad materials can be fabricated by welding wrought materials,, mainly sheet and plate, also formed heads and shapes. Electric arc welding with metallic electrodes is the most commonly used, although carbon arc, atomic hydrogen, as well as gas welding is sometimes empolyed, usually for specific cases.

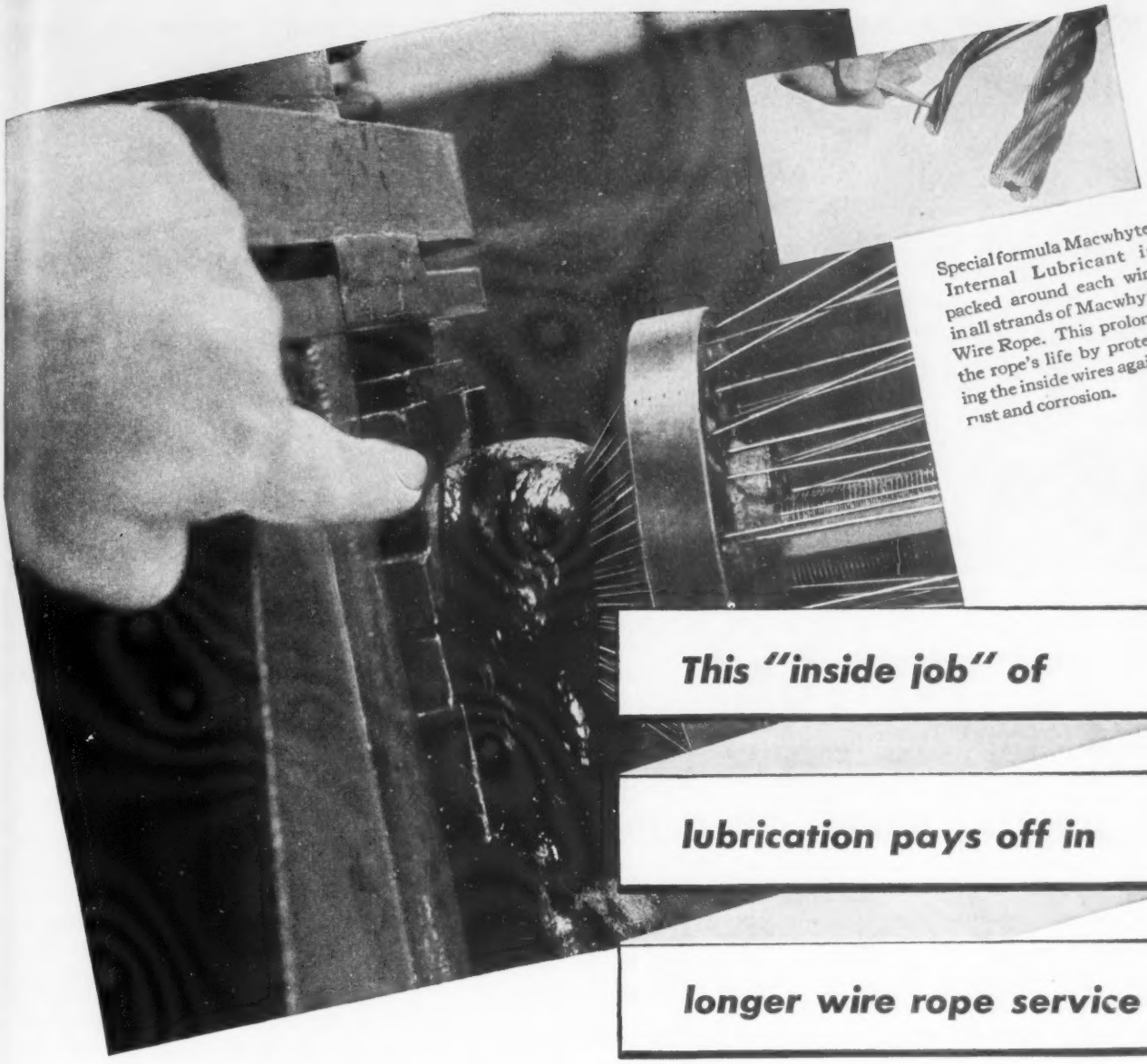
It is recommended that butt type welds be used where at all possible, eliminating fillet and lap welds. Welds in sharp corners are objectionable and can usually be eliminated by forming, bending or flanging. It is usually desirable to use flanged only, or flanged and dished heads, or conical sections in preference to flat bottoms in tanks, thus eliminating fillet welds and permitting butt welding. Careful "fit-up" and holding of component parts in position by tack welding is very important. Selection of proper corrosion resistant electrodes is also important.

Care should be exercised in the shop in forming bending, breaking, or rolling operations with corrosion resistant clad steels. Equipment should be maintained clean, particularly free from dust or foreign materials. Continuity of corrosion resistant surface is very important in the design of corrosion resistant equipment and particularly so with clad steels. Good engineering and equipment design are equally as important as selection of proper corrosion resistant material and good fabrication. With proper attention to these factors plant processing equipment of almost all types can be fabricated of corrosion resistant clad steels.

PREPARATION OF METALS FOR PAINTING

From Paper by
R. E. Gwyther
Sherwin-Williams Co.,
Cleveland

Paint protects metals in two ways: First, by separating the metal from its corrosive environment. Such protection is not perfect because paints known



Special formula Macwhyte Internal Lubricant is packed around each wire in all strands of Macwhyte Wire Rope. This prolongs the rope's life by protecting the inside wires against rust and corrosion.

This "inside job" of lubrication pays off in longer wire rope service

Because it's thoroughly lubricated *on the inside,* Macwhyte Wire Rope lasts longer on your equipment. Our heavy, tenacious, special formula lubricant gives long-lasting protection. It is force-fed to wires as they are being closed into the strand. All wires, both inside and outside, are thoroughly encased in lubricant.

Macwhyte Internal Lubricant improves the sliding action of the wires as they move in bending around sheaves and drums. It gives outside protection—but even more important, it protects the unseen inside wires which constitute the reserve strength and safety of the rope.

Extra life, assured by superior internal lubrication, quality materials and precision manufacture, makes Macwhyte Wire Rope your best buy.

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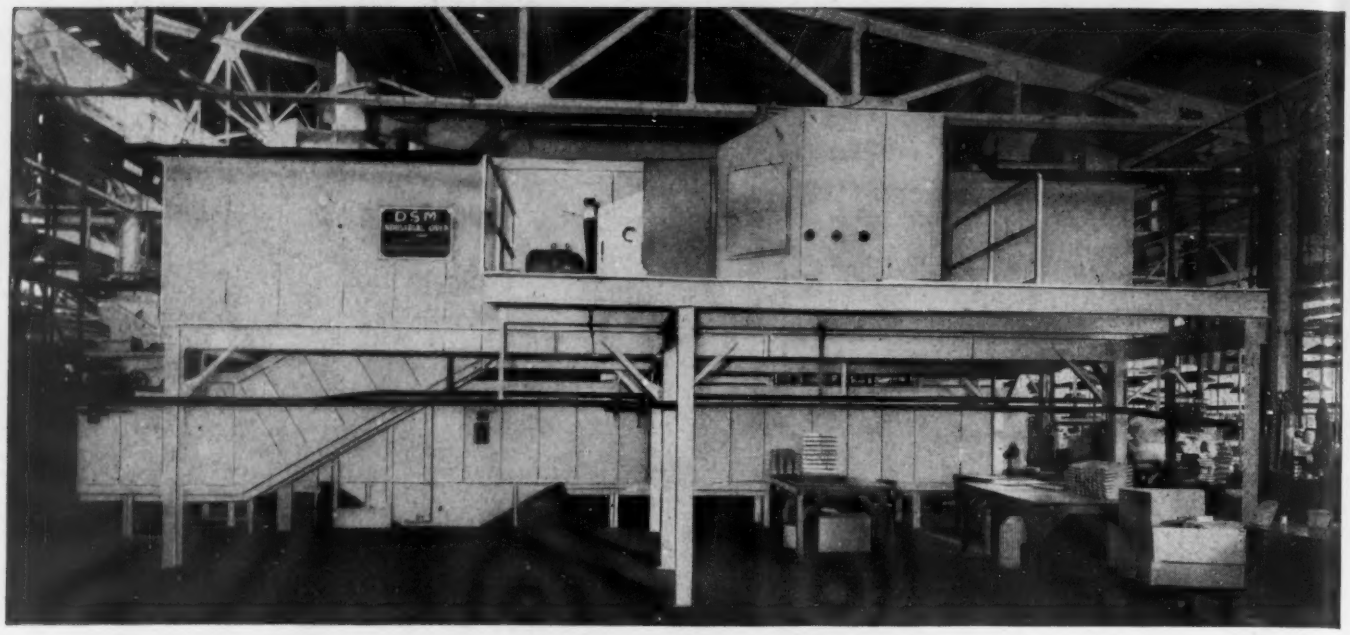

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PLANT ENGINEERING: *Consulting assistance in plant layout to coordinate departmental operations, our experience dated from 1917 in this field.*

Such plant layout may be based on increasing production beyond present capacity, or it may be a rearrangement in this post-war period when operations are conducted under a new set of conditions.

MOTOR CLEANING EQUIPMENT: *Washing machines for cleaning teardowns. Kerosene spray or similar solvent usually used as the cleaning medium.*

FORMED COWLINGS, PANELS, ETC.: *To your specifications, and of light metal alloys as required. Weldments and brazed assemblies may be under controlled atmosphere.*

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PAINT SPRAY HEATING, VENTILATING, COOLING, DRYING, HUMIDIFYING SYSTEMS, JAPANNING AND INDUSTRIAL OVENS, INDUSTRIAL WASHING MACHINES

today are not completely impervious to moisture and oxygen. Second, by the use of inhibitive pigments, which provide protection when the paint is penetrated by corrosive elements. In spite of this dual nature of paint protection, even the best of paints applied to an improperly prepared surface may fail to give the desired degree of protection.

Cleaning: In general, all foreign materials must be removed from the surface of metals before painting. Small quantities of oil and grease will prevent adhesion between the paint and the metal. Paint which does not have good bond to the metal tends to blister when exposed to moisture. Blistering is aggravated by the osmotic effect of water-soluble materials present on the metal surface.

The following are methods for cleaning sheet or other smooth metal surfaces: A widely used but undependable method of solvent cleaning is to wipe the metal with rags soaked with petroleum or aromatic solvents. Spray application of the solvent is more effective; the fire hazard is bad, but probably no worse than that of large quantities of solvent-soaked rags. For test panel cleaning the Sherwin-Williams Co. has used spray solvent cleaning with considerable success using a mixture of naphtha and xylol.

Procedure is to spray the solvent with an ordinary paint spray gun, with atomization jets nearly closed, from an acute angle. This method is under test by the ASTM as a possible standard method for test panel preparation. An important application of solvent cleaning is vapor degreasing, using the noninflammable solvents trichoroethlylene or perchlorethylene. For stubborn soils, immersion or spraying methods may be used, the final cleaning in any case being in the vapor phase.

Alkaline cleaners may be used by immersion or by spraying, but must be followed by very careful rinsing, since any alkaline residue will react with saponifiable portions of the paint, destroying paint adhesion.

Emulsifiable cleaners, consisting of grease solvents plus soaps and detergents to give better emulsification and rinsing qualities, may be sprayed, dipped, or brushed on the metal and then followed by thorough rinsing. These cleaners present the advantage of flexibility of use.

Mechanical scraping, wire brushing, or sanding by hand, are methods used for removal of corrosion products and scale from heavy metal.

Blasting with sand, grit or shot, produces a chemically clean surface. A recent patent in blasting technique includes the addition of rustproofing chem-

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If you are now using standard fastenings that are not fully satisfactory for the purpose, send us full particulars and we will gladly recommend Specials designed specifically for your particular application. Specially designed fastenings often eliminate extra parts and assembling operations while strengthening the assembly.

Special equipment, representing the latest improvements in high speed, precision machinery, together with experienced engineering talent assure the most precise, efficient Specials that can be produced. Send samples, specifications or blue prints for quotation.

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—PHILLIPS—
Recessed Head Fastenings
As bit cannot slip from recessed head, spiral and power drivers can be safely used, even on finished parts, to cut your fastening time in half!

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icals to the abrasive to produce passivation and cleaning simultaneously.

Pickling is widely used to remove scale and corrosion products. One disadvantage is flash rusting after pickling, which can be controlled by a phosphoric or chromic acid rinse.

Electrolytic pickling is sometimes used in molten caustic or in molten salts for removing mill scale and other corrosion products from steel.

Flame cleaning is used to remove scale by extremely rapid heating followed by rapid cooling. Differences in expansion cause the scale to break away from the underlying metal. Flame cleaning is also used to remove condensed moisture from structural steel prior to painting.

Chemical Treatments for Iron and Steel: Phosphate treatments are the most successful treatments for iron and steel prior to painting. The phosphate solution consists of an aqueous solution of phosphoric acid saturated with phosphates of the metals (principally) iron, manganeses, zinc, or cadmium, plus an accelerator. Iron or steel immersed in the solution at near boiling temperature for a period of 1 to 5 min is coated with metal phosphates which are crystalline and chemically united with the metal surface. Phosphate coatings are insoluble, passive to corrosive reactions, abrasion resistant, and adherent. Thus they provide an excellent base for paints, and prevent spread of corrosion under the paint film. A typical production sequence for phosphating is as follows: (1) Alkaline clean, (2) cold rinse, (3) hot rinse, (4) hot phosphate dip or spray, (5) rinse, (6) dilute chromic acid rinse.

Phosphoric acid cleaners consisting of phosphoric acid, grease solvents, such as alcohols, chromates, and synthetic detergents, may be applied hot in a process similar to that described above. They produce an amorphous coating at lower cost, but with less protection than the straight hot phosphate method. The amorphous coating so produced permits better paint gloss than the crystalline type coating.

Chromic acid in very dilute solution is used as a final rinse after phosphating. Chromic acid rinse as a single operation after cleaning has been found to have considerable passivating effect on iron and steel. A typical production sequence follows: (1) Alkaline or emulsion clean, (2) cold rinse, (3) hot rinse, (4) rinse in hot dilute chromic acid, or in some cases dilute chromic and phosphoric acid mixture. Structural steel—the most pertinent characteristic of structural steel is the presence of hot roling scale. The scale is comparatively brittle and will crack or break under stress, particularly

Refractory Concrete

THE ADAPTABLE REFRACTORY

CAST-IN-PLACE TO FIT THE JOB. Arches, skew-backs, tapered wall sections, jointless linings are formed in exactly the shape, size and location needed. No cutting and trimming of pieces, no patching up with bats and mortar.

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QUICKLY INSTALLED AS NEEDED. Refractory aggregates and LUMNITE are mixed with water and cast into forms or molds. LUMNITE is a rapid-hardening binder, so Refractory Concrete is ready for service in 24 hours or less.

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THERMAL PROPERTIES AS REQUIRED. Service characteristics—refractory limit, insulating value, heat storage—are determined by type of aggregate and proportions of mix. With LUMNITE and two or three low-cost aggregates in stock you have materials for a large variety of refractory jobs.

Adaptable to ***SERVICE*** *requirements*

Ready-To-Use

CASTABLE REFRACTORIES

Factory-prepared mixtures of LUMNITE and selected aggregates offer you a convenient means of making Refractory Concrete—simply mix with water and cast in place. Obtainable everywhere from distributors of Refractories.

Specify Castables

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Universal Atlas Cement Company

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New 6" and 4" Electric Weld Steel Tubing and Couplings

6,000,000 ft. 6" O.D., .109 Wall Thickness
1,000,000 ft. 4" O.D., .083 Wall Thickness
All 20 ft. lengths exact

This tubing is new, excellent and has been hydrostatically tested to 900 pound pressure p.s.i. Every 20 foot length of tubing has welded on each end a 6" (6⅝" O.D.) or 4" (4½" O.D.) pipe nipple which is grooved for use with gasket type coupling.

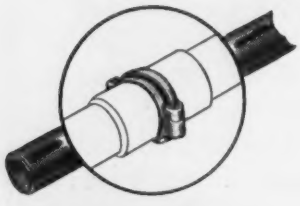
This tubing is recommended for normal use and application on steam, oil, gas and water lines, for columns and other structural purposes.

Prompt shipments can be made from various locations throughout Ohio, Pennsylvania and New Jersey.

Prices will be submitted upon application, and special arrangements are available to jobbers.

Representative samples of both sizes of couplings and tubing may be inspected at our various warehouses.

Application of Coupling



Coupling Detail

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Berry & North 13th Street
Brooklyn 11, New York
Phone Evergreen 7-8100

L. B. Foster Company
P.O. Box 1647
Pittsburgh 30, Pa.
Walnut 3300

Albert & Davidson Pipe Corp.
2nd Avenue—50th, 51st Street
Brooklyn 32, New York
Phone Windsor 9-6300

if heavy. Rust tends to form at crevices and spread between the scale and the metal. The best treatment for scale is to remove it entirely by pickling or blasting followed by a chemical treatment or a coating of primer immediately. If not removed completely mill scale is better not removed at all. The worst possible way to remove scale is first to loosen it by weathering. Unfortunately, this method is rather widely practiced.

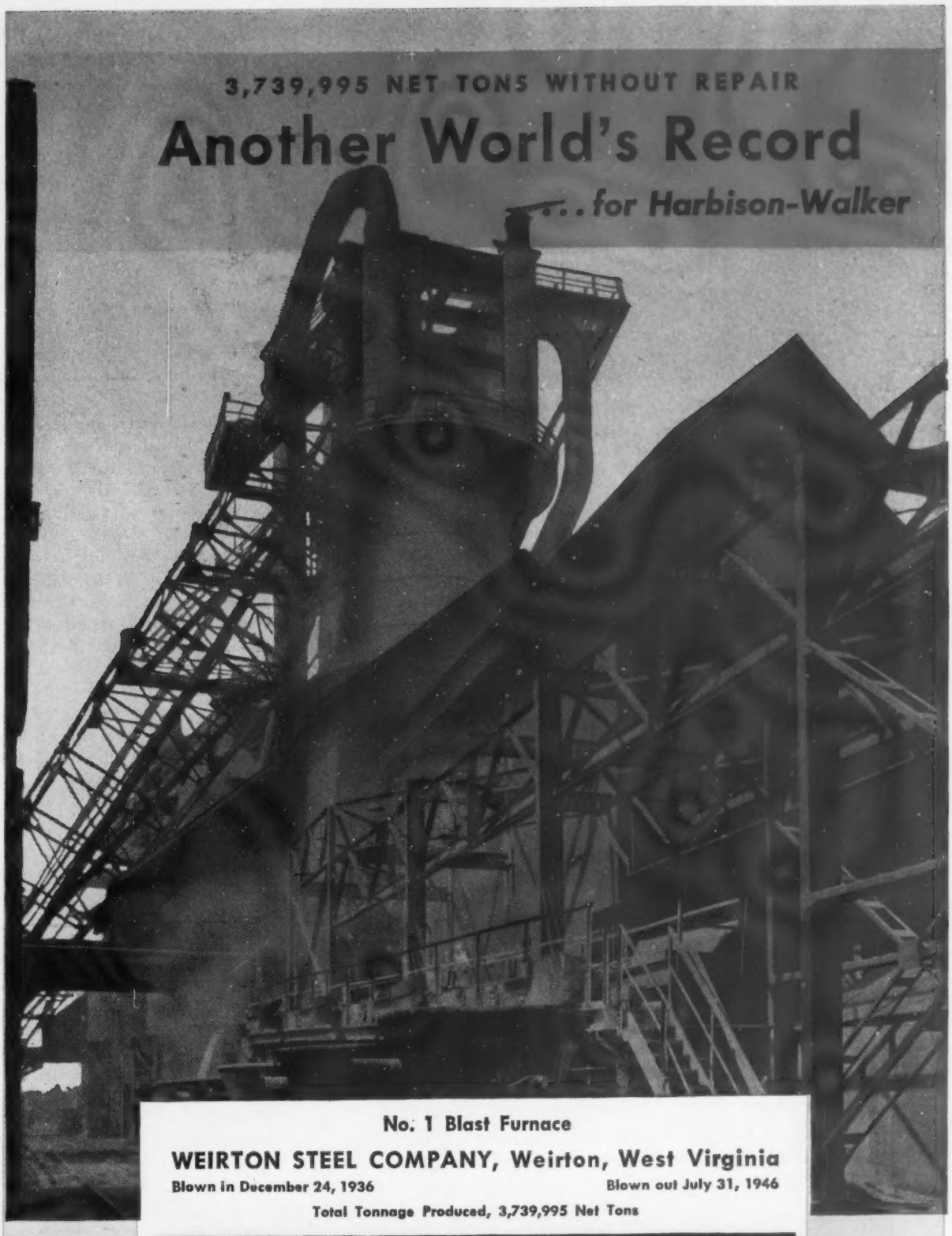
Hot phosphate treatments are excellent for structural steel, but the process can be used only prior to erection of a structure. Phosphoric acid cleaners are used successfully for cleaning ship hulls, storage tanks, and other relatively smooth surfaces. If used for structural framework containing joints, crevices, etc., in which the acid can collect, excessive phosphoric acid must be removed from crevices or from under loose edges of scale. If not removed the resulting damage to the paint film will more than offset the value of the treatment.

Chemical Treatments for Nonferrous Metals: The best chemical treatment for zinc and galvanized iron surfaces that are to be painted is the hot zinc phosphate treatment previously recommended for steel. Chromate and dichromate treatments, as a class, produce a passive surface on zinc satisfactory for paint application. Alkaline dichromate treatment or a special type of phosphoric acid treatment is generally satisfactory for preparation of aluminum for painting. When the ultimate in paint film performance is required, anodizing, although relatively expensive, is sometimes used as a method for preparing aluminum for painting. The chrome-pickle treatment and the dichromate process are the most widely used methods for preparation of magnesium surfaces for painting.

FUNCTION OF SPECIFICATIONS IN ELECTROPLATING

From Paper by
C. E. Huessner,
Carl O. Durbin
and D. W. Munro,
Chrysler Corp, Detroit

Function of specifications on electroplating products is to enable the manufacturer or assembly line operator to secure coatings from platers that will be satisfactory for the service intended at the lowest cost of production. Zinc plating is specified by the Chrysler organization where protection against corrosion is the chief factor. Such coatings may be furnished in two classes differing chiefly in the thickness of the coating. Class A coatings are used for direct exposure to outside weather conditions and for parts which experience has shown require similar protection; specifications



No. 1 Blast Furnace

WEIRTON STEEL COMPANY, Weirton, West Virginia

Blown in December 24, 1936 — Blown out July 31, 1946

Total Tonnage Produced, 3,739,995 Net Tons

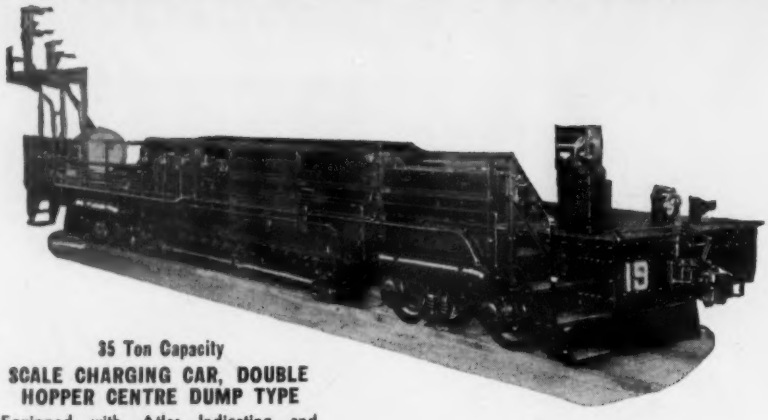
Not a single brick replaced during the almost ten years of continuous operation

HARBISON-WALKER REFRACTORIES COMPANY
and Subsidiaries

WORLD'S LARGEST PRODUCER OF REFRACTORIES

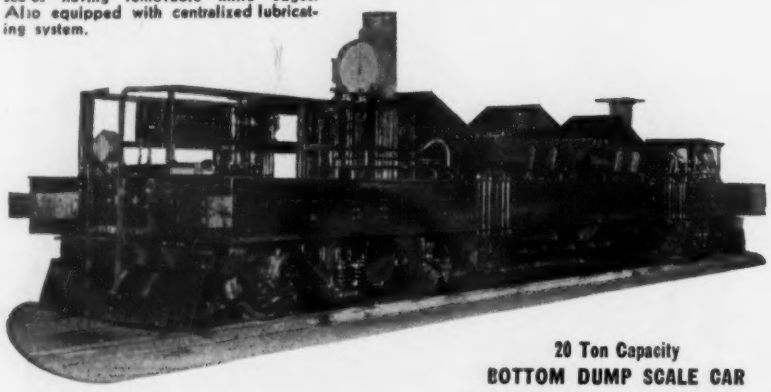
1800 FARMERS BANK BUILDING • PITTSBURGH 22, PENNA.

ATLAS
SCALE CHARGING CARS



35 Ton Capacity
SCALE CHARGING CAR, DOUBLE HOPPER CENTRE DUMP TYPE

Equipped with Atlas Indicating and Recording Dial. Car is provided with extra-heavy all steel roller suspension scales having removable knife edges. Also equipped with centralized lubricating system.



20 Ton Capacity
BOTTOM DUMP SCALE CAR

For use with roller bin gates. Equipped with Atlas underslung roller suspension scales and Atlas Indicating & Recording Dial.

Builders of:

DIESEL ELECTRIC AND STORAGE BATTERY LOCOMOTIVES FOR INTERPLANT HAULAGE

SCALE CHARGING CARS AND ORE TRANSFERS FOR BLAST FURNACE STEEL PLANTS

COAL CHARGING CARS, CLAY CARRIERS DOOR EXTRACTORS, COKE GUIDES AND COKE QUENCHING CARS FOR BY PRODUCT COKE PLANTS

TURNTABLES

INDICATING AND RECORDING DIALS FOR WEIGHING SCALES

The ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1100 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

call for a minimum thickness of 0.0005-in. of zinc plate on the significant surfaces. Class B coatings are used for protection of parts not exposed directly to outside weather conditions; specifications require a minimum thickness of 0.00015-in. zinc plate on the significant surfaces.

Additional requirements are that Class A zinc coatings show no appearance of rust in 100 hours of salt spray testing and that Class B zinc coatings show satisfactory resistance for 50 hours of salt spray testing. The salt spray test for ferrous parts is conducted with a 20 per cent solution of sodium chloride (sp. gr. 1.15) under conditions that produce a dense fog throughout the container without the spray being blown directly against the specimens.

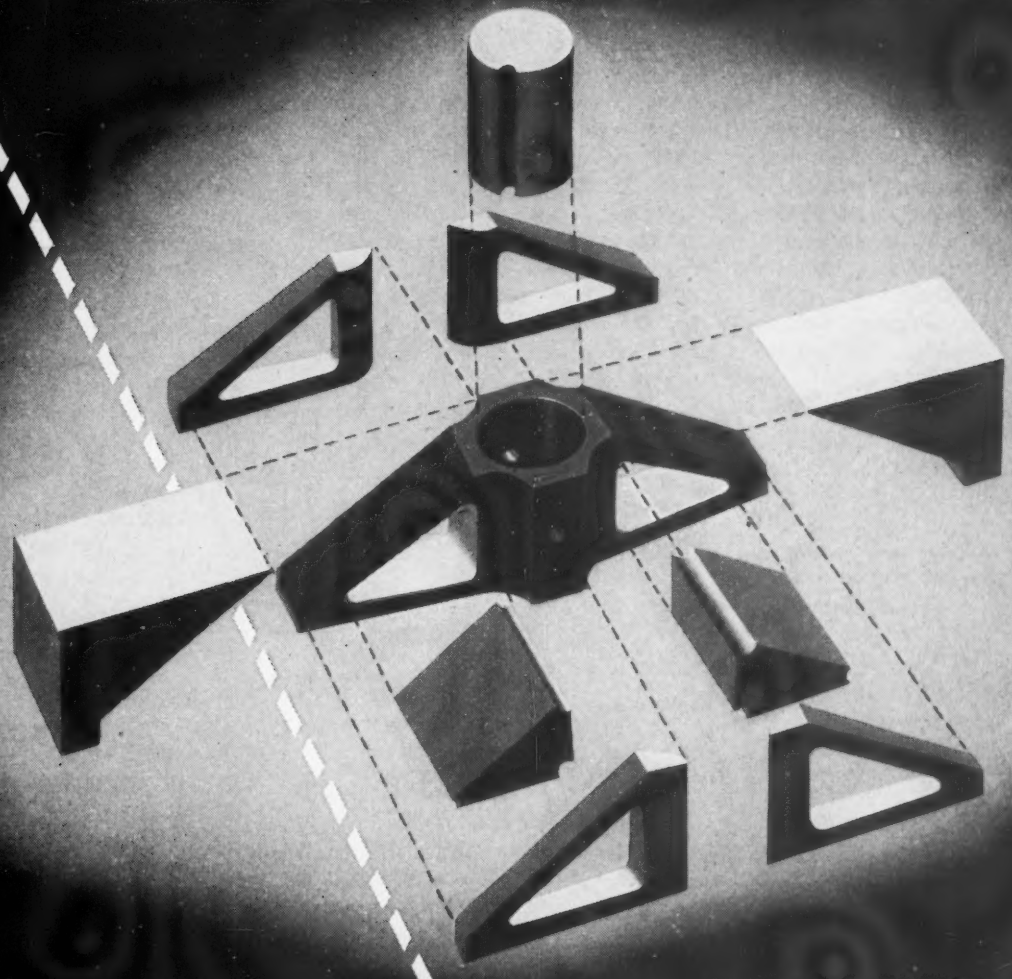
The specimens are supported by glass or other insulating material with the significant surfaces at an angle of 15° from the vertical. The temperature in the box is maintained, by thermostatic control, at 95° F plus 2° F or minus 3° F. This is about the lowest temperature that can be maintained throughout the year without artificial cooling. The solution formed by condensation of the spray should be drained off and not used again. Certain other general requirements with reference to appearance, defects in coating, adherence and ductility, and absence of plating salt residues, must also be passed by all zinc plated parts.

Spring steel and other ferrous parts which are exposed to extreme service conditions are processed in accordance with the latest methods used in producing a chromium plate for decorative purposes using either a nickel or copper-nickel undercoat. The specifications call for nickel plating of parts from a standard Watts bath to a minimum depth of 0.0015-in. after buffing. Suppliers desiring to use a copper plate prior to the nickel plating may do so provided the minimum depth of the exterior nickel is 0.0006-in. after buffing. Also the minimum combined depth of the copper and nickel specified for the finished parts is not less than 0.0015-in. after buffing. Following the application of these undercoats the parts are provided with a plating of chromium to a minimum thickness of approximately 0.00001-in. (0.15 gr. or 0.00529 oz/sq ft).

Another specification for decorative chromium plating, for less severe service conditions, specifies a nickel undercoat of 0.001-in. minimum thickness after buffing. If copper-nickel undercoat is used the minimum thickness of the exterior nickel is required to be 0.0004-in. after buffing or the minimum combined depth of the copper and nickel on the

oALL Contour Sawing

MIRACLE METHOD OF LOW-COST PRODUCTION



fast "slicing" *not* slow "whittling"

World's Fastest Metal-Removing Process

Countless production parts sliced to shape and size in minutes—not hours or days as with other processes. Contour Sawing leaves only a 1/16" kerf—does not waste time "whittling" metal to worthless chips. Smooth power at infinitely varying speeds moves an endless band edged with razor-sharp, superhard teeth—untouchable with a file! Cutting is continuous—no wasted backstroke. Does internal as well as external cutting through tough steel up to 30" thick.

Endless applications in production, maintenance and toolroom work. A finished "casting" is cut faster than making drawings and patterns, besides saving time of casting and machining. Write for "DoALL Equals Ten Plus" which pictures advantages of Contour Sawing.

The DoALL Company

DOALL STORES
IN PRINCIPAL CITIES

MACHINE TOOL DIVISION
MINNEAPOLIS 4, MINN.

finished parts is specified to be not less than 0.001-in. after buffing. The amounts of chromium required as the outer coating is the same as that given above.

On interior automobile body hardware (ferrous parts) the minimum depth of nickel plate of the finished parts is required to be not less than 0.0005-in. after buffing; if a copper-nickel undercoat is used the minimum depth of the exterior nickel is required to be 0.0003-in. after buffing with a combined depth of the copper and nickel plate on the finished parts of not less than 0.0005-in. after buffing. The requirement on chromium plate thickness remains the same as that specified above.

Specifications on zinc base parts requiring a decorative chromium finish require a depth of 0.0008-in. minimum nickel after buffing or, in parts where a copper-nickel undercoat is used, a minimum depth of 0.0003-in. copper is specified together with a minimum of 0.0003-in. of outside nickel plate, with a combined minimum thickness of 0.0008-in. of copper and nickel. All deposited coatings are calculated after buffing.

On zinc cast parts intended for interior body hardware, the minimum nickel plate required is not less than 0.00024-in. after buffing; if a copper-nickel undercoat is used the minimum depth of the copper layer is required to be not less than 0.0002-in. with the exterior nickel plate having a minimum depth of 0.00024-in. and finally a total minimum combined thickness of copper and nickel plate of 0.00044-in. The specification for outside chromium plate thickness on the zinc cast parts is the same as for ferrous parts, being approximately a minimum thickness of 0.00001-in. All decorative chromium plated parts are required to withstand certain standard salt spray tests, as specified by the Chrysler Corp.

Chromium plating on steel or cast iron piston rings for wear resistance require a minimum depth of chromium deposit, after lapping, of 0.004/0.006-in. The desired depth of pores in the chromium plate on the face of the finished ring is 0.0007/0.0015-in. The hardness of the chromium plate after polishing off the porous layer is required to be 850 minimum Vickers, or equivalent. Also, for this type of deposit it is specified that the surface finish on the chromium plated area of the completed ring, as measured by Profilometer on the outside diameter at right angles to the side faces of the ring is not to exceed 90 microinches rms.

Threading . . . fine Instrument Parts

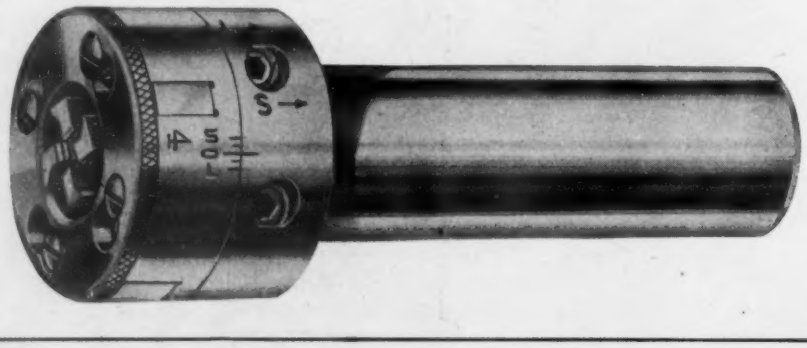
GROWING need for speed, accuracy and low cost in threading parts for watches, clocks, cameras and all kinds of small, fine instruments brought about the development of small die heads, such as the style EJ5, manufactured by Geometric Tool Co., New Haven, Conn. Featuring light weight and fewer parts, the die head shoulder is compact and can be fitted into a very limited space on any machine for which it is designed.

Steel easily removed retaining rings, are utilized in the design of the head. Ground cam lugs that engage chasers provide a smooth surface for accuracy of the head.

Engineered for Swiss type automatics, such as Gorton, Partemann, Ceco, Wickman and others, the head is designed with a rigid shank which fits over the spindle and is driven by a cross pin held in position on both sides by the steel retaining ring. Another similar ring holds the head together.

Equipped with a forward floating shank, the head is applied directly to the turret of the No. 00 or No. 00G Brown & Sharpe automatic screw machine without use of special holders. It also is (with a rigid shank) sold to manufacturers for their aligning holders, such as Alco and Brown & Sharpe. Capacity of die head is from 1/16 to 3/16 (No. 0 to 10,) inclusive.

The Geometric heads include high speed ground thread chasers with 3/32-in. projection. Latter facilitates threading close to a shoulder. Use of left-hand chasers adapt the heads for left hand threading. Chasers can be adjusted to cut within close tolerances by loosening the four front plate screws, loosening one adjusting screw and tightening another to obtain desired accuracy.



PROBLEMS OF AUTOMOTIVE COOLING SYSTEM CORROSION INHIBITION

From Paper by
D. H. Green
and
R. A. Willihnganz
National Carbon Co., New York

The metals commonly encountered in automotive cooling systems are cast iron, steel, aluminum, brass, copper and solder. Factors which normally accelerate the corrosion of cooling system metals include coolant flow characteristics, aeration, exhaust gas leakage into the coolant, corrosion by-products, couples of dissimilar metals, metal hot spots, coolant operating temperatures, metal stresses, and coolant water supplies containing salts such as chlorides and sulphates. The problem of corrosion inhibitor development is complicated by these factors.

Only a balanced program of laboratory tests, controlled engine tests, and large scale field tests, can be used to assure the satisfactory performance of a given inhibitor or inhibitor combination. Corrosion inhibitors which have been found to be effective in automotive cooling systems are of two types, alkaline buffering materials such as amines and borates and film forming materials such as oils, phosphates, chromates, nitrites and silicates. Best known performance can be obtained with a combination of two types.

—o—

Floors can be used immediately after they are repaired with Swift Floor compound, it is claimed, as the material sets by compression rather than by water evaporation. Containing no asphalt, cement or gravel, it will not crack, crumble or curl, according to Monroe Co., Cleveland.

Improved Mill Practice

(*Continued from Page* 132)

scrap because the minimum operating diameter had been reached. The majority of these rolls had to be removed and machined after 12 turns of operations, thus the total life after three or four machinings was from 36 to 48 turns. For the past two years we have welded these rolls with an approximate SAE 6135 analysis core wire which has 0.35 per cent carbon, 0.75 manganese, 0.25 silicon, 1.00 chrome, and 0.15 vanadium with a deposited analysis of 0.18 carbon, 1.80 manganese, 0.60 silicon, 0.65 chrome and 0.10 vanadium. In this operation we believe a 500 per cent preheat and concurrent heat are essential for best welding results. Many of these rolls have been welded 10 to 12 times and are still far above the minimum working diameter because each weld deposit of approximately 20 lb simply replaces the metal worn away by the rolling operation.

Electrodes Are Conserved

Definite advantages in automatic welding include the following: Etch testing shows the weld deposits as clean, dense and deeply penetrated. Higher speeds and currents are practical. Electrode consumption is reduced because weld spatter and most stub end loss is eliminated. Production increases are the result of the elimination of such elements as operator fatigue and the change of electrodes. Finish machining time is reduced because of the close tolerances and the smoother working surface.

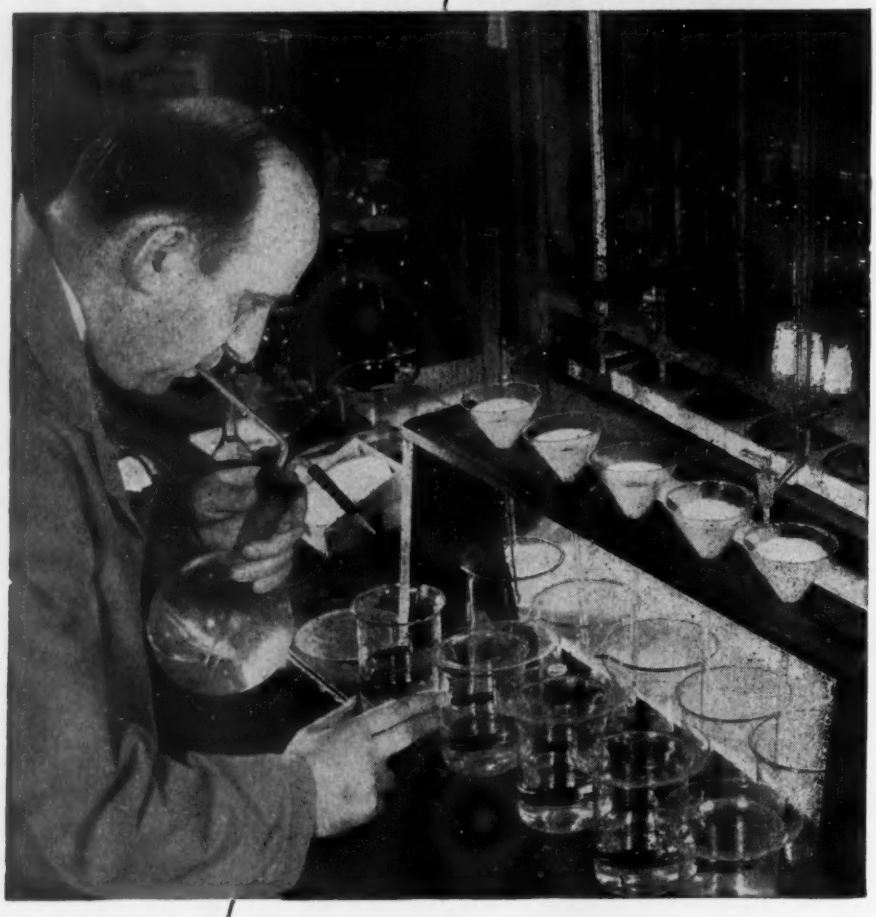
Storage Yard Material Handling, by F. C. Wier, Timken Roller Bearing Co., Canton, Ohio; In our new scrap yard, piles in general are limited to 1000 tons. When this tonnage is reached a new pile is started. If the flow of material is reversed and loading is started from a pile no more is added to that pile. With the more active types of scrap there usually is a pile being made and another which is being depleted, both in existence at the same time. This small pile method eliminates the necessity for year end inventory adjustments. Any irregularity in weight is exposed and adjusted as each pile is exhausted. This method also permits classification on a physical basis in addition to alloy type segregation. If, through an error, a mix-up should occur only a relatively small amount of scrap is contaminated with another type.

The comparatively rapid pile movement allows maximum flexibility in yard capacity, since one type of scrap often diminishes as another increases. No effort is made to pile the same type in the same spot time after time. An absolute cleanup is made when a pile is depleted. This necessitates a layer of loose material over the entire yard area. Crushed slag, 4 to 6 in. deep, is used for this purpose. Remaining loose and being porous, no water can stand in contact with the stored material. Scrap or any other material does not freeze fast in the winter. No trouble is experienced with scrap sinking into soft wet earth, and even small pieces of scrap clean up readily with the use of a magnet.

Relation of Refractory Economy to Combustion in Steel Mill Furnaces, by E. N. Hower, Carnegie-Illinois Steel Corp., Pittsburgh. In addition to the actual tonnage of steel saved from loss as scale, there may exist an intermediate but important saving by reduction of surface defects on the product. This decrease in the formation of scale during heating occurs because a change from negative to positive furnace atmospheric pressure is generally accompanied by a change from a highly oxidizing atmosphere to one which is more nearly neutral or reducing. These cost savings are real but impractical of exact measurement by ordinary means. This reduction of scale loss, however, may present other problems which illustrate the far reaching effects of a single change in practice

OVER 100,000 TONS OF METAL IN BLAST FURNACE LADLES BEFORE REPLACEMENT
Blast Furnace Iron Ladle (car ladle), showing section to illustrate easy installation of Buckeye Silica Firestone.
● Enjoy the economy of extra heats by lining your ladles with Buckeye Silica Firestone. Records are being continually broken by this modern refractory . . . machine-cut or hand-split to any dimension.
Just as good for lining soaking pit furnaces, converters, mixers, cupolas. Proof of performance given in Bulletin 15-B, sent upon request, or ask for a Buckeye engineer.
THE CLEVELAND QUARRIES COMPANY
1125 GUILDHALL BUILDING
CLEVELAND 15, OHIO
BUCKEYE SILICA FIRESTONE
BUCKEYE
"FOR THAT EXTRA SERVICE"
SILICA FIRESTONE

Keeping
STEEL CASTINGS
quality
at **Par**



The use *of only the highest grade scrap and pig iron obtainable goes a long way toward keeping the quality of Strong casting steel up to par. Beyond that, this quality is further safeguarded by the constant vigilance of the laboratory.*

Each heat is subjected to rigid chemical and temperature checks during the refining process and a running record is kept of the chemical and physical properties of every melt.

Only from trouble-free steel can trouble-free castings be made.

STRONG IN NAME
STRONG IN FACT

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N.Y.

Strong

TENSILE STRENGTH · ELONGATION

and the close relationship between the various phases of steel making.

If, for example, the open-hearth pouring practice had been such that small blow holes were located close to the skin of the ingot, then a heavy scale formation in the soaking pit furnace would remove this porous section and produce a slab, billet or bloom with a good surface. If this heating practice were changed with a resulting decrease in scale formation, these blow holes might then appear as surface defects on the product of the rolling mill. Here a change in deoxidation practice would be required, either to eliminate the subsurface blow holes, or to place them deeper in the ingot.

Chemical Removal of Scales, Sludges and Oxides from Blast Furnace Cooling Systems and Allied Steel Mill Equipment, by B. H. McDaniel, Dowell Inc., Philadalphia; In the bosh system of a blast furnace, the soaking period of the solvent is seldom longer than 5 min, while from 30 to 35 min periods may be necessary on the upper stack. It is a customary practice to predetermine the approximate time the solvent safely may soak in each section of the furnace by making preliminary tests with water and recording the temperature changes.

The method now employed for cleaning a furnace cooling system is to isolate the separate cooling cycles or feeds from the overall system and treat each cycle independently. The treatment consists of alternate stages of solvent, with water washing and air blowing between stages. This is repeated as often as is required, or until increased flow rates and the drop in solvent concentration is sufficient to indicate that scale restrictions have been removed.

Chemical cleaning of blast furnace cooling systems should result in longer life for the cooling system and furnace walls, and a reduction of maintenance costs of the system during its economic life.

Three separate effects are obtained through the use of chemicals in scale removal. First, the chemicals remove the scale formation, which in itself will restore the heat transfer efficiency of the unit. Second, following removal of the scale deposits, any active corrosion which may exist will tend to be retarded. And, third, following the scale removal, the increased flow and cooling exchange rates will tend to reduce excessive scale deposition.

Chemical scale removal, properly used, is economical, requiring only a minimum of downtime for the units involved. No system is too complex or inaccessible to be reached by the solvents and no extensive preparation or dismantling of the unit is entailed.

German Technical Data For American Business

Program of obtaining German scientific and technical information for American business is being broadened into a regular international interchange of such information, Office of the Publication Board, Department of Commerce announced recently.

Teams organized by OPB and composed principally of American businessmen are operating in the British, Russian and French zones. They are said to have obtained priceless information, all of which will be made available to U. S. business. In turn British, Russian and French teams are working in the American zone.

Progress is being made toward a continued exchange of technical data. Recently an American team working in the Russian zone was offered a collection of valuable chemical documents originating in the Soviet Union. Part of the American contribution is a "Bibliography of Scientific and Industrial Reports," containing abstracts of all reports released by OPB. Printed as a service to business, this publication is issued weekly by the Superintendent of Documents.

Masonry Cutting Blade Has Low Cost Per Cut

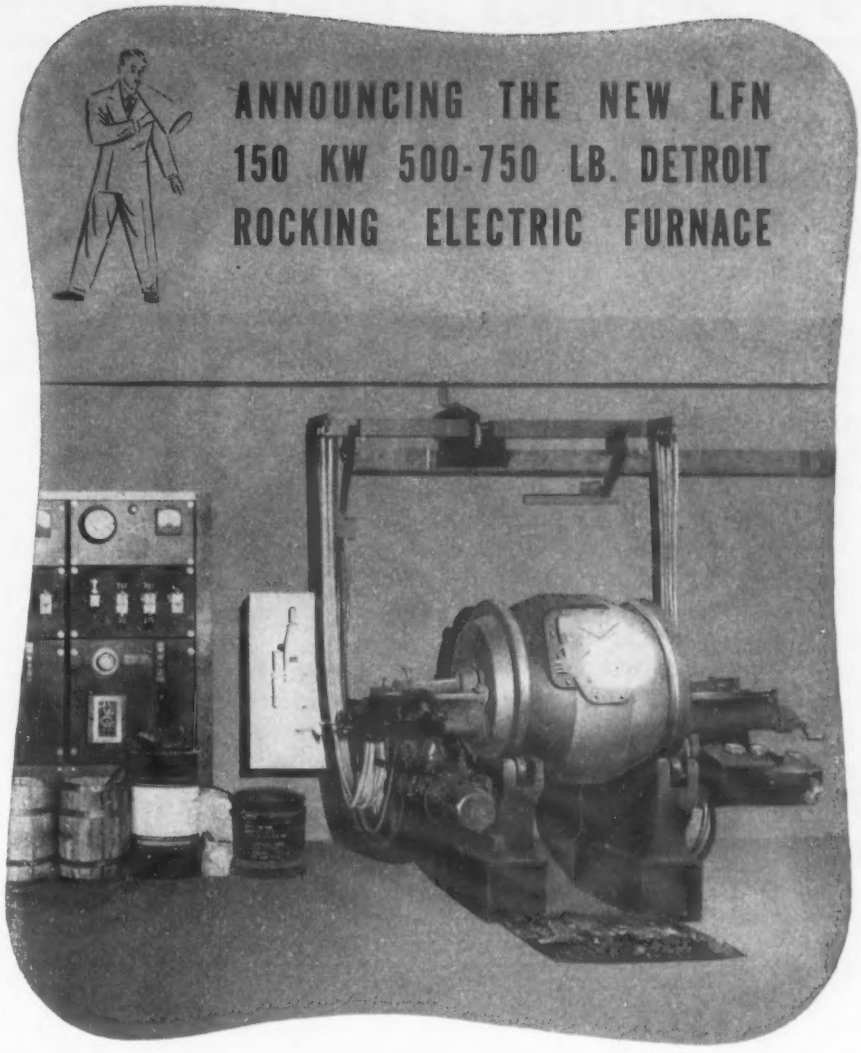
A new masonry cutting blade which is claimed to have long life, lower cost per cut, quick cutting ability and which eliminates operator eye strain is introduced by Champion Mfg. Co., 1307 Washington boulevard, St. Louis.

Called the Jade blade because of its color, it is available in 12 and 14 in. sizes which the manufacturer claims will fit any type of masonry cutting saw. Blades are equipped with blotters for safety in operation and steel centers which are said to protect the machine shaft and provide for efficient operation.

Steel Wash Fountains Available Again

Redesigned stainless steel and enameled iron wash fountains of several sizes and styles are being produced by Bradley Washfountain Co., Milwaukee, after having been discontinued during the war. Said to be capable of serving as many as 8 to 10 persons simultaneously, the manufacturer claims the fountains assure users of maximum sanitation plus savings in space and installation costs.

Stainless steel fountain bowls are pressed from heavy gage 18-8 steel, while the iron bowls are one-piece pressings of deep drawing steel.



WITH AUTOMATIC ELECTRODE CONTROL

To its already extensive line of fast melting electric furnaces, Detroit Rocking Electric Division has added a new model—the type LFN, 150 Kw., with 500 lb. nominal cold charge capacity, 750 lb. molten metal capacity. It will melt 900 lbs. of bronze per hour, or 500 lbs. of cast iron. Like other Detroit Electric Furnaces, this model has the well-known rocking action which produces automatic stirring. All melting factors, such as time, temperature, and composition, are under the sure, easy control of one man. The type LFN is available with attached electrode brackets and mechanical automatic electrode control, as shown above; or pedestal mounted electrode brackets with automatic hydraulic electrode control. There is a Detroit Rocking Electric Furnace to meet your needs—from 10 to 4000 lbs. capacity. Send us your melting requirements, and our engineers will recommend the specific model best suited to your particular production.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

The Business Trend

Industrial Activity Rate Equals Postwar High

RISING SLIGHTLY in response to increased production of automobiles, STEEL's industrial production rate in the week ended Oct. 5 equaled the postwar high of 154 per cent set in the week ended Sept. 14.

Estimated at 90,165 passenger cars, trucks and busses, the automobile output in the week ended Oct. 5 was only 1195 units below the postwar high of 91,360 in the week ended Aug. 24. However, further new postwar highs in auto production are improbable in the near future because of difficulties of obtaining sufficient supplies of sheet and strip steel. In fact the continued shortages have prompted several important companies in the automobile industry to make drastic cuts in their forecasts for October production.

STEEL—Output of steel ingots continues at approximately 90 per cent of capacity. Despite an electric power strike at Pittsburgh, steel production there has continued at near capacity levels since most of the steel producers have their own electric generating plants.

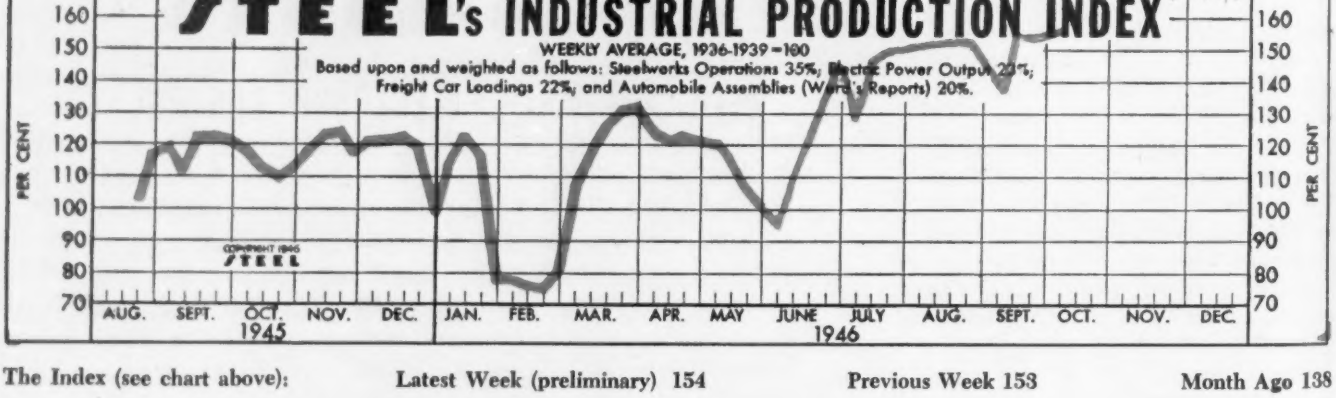
INDUSTRIAL ACTIVITY—A new postwar peak was reached by the Federal Reserve Board's industrial production index for August. At 176 per cent of the 1935-1939 average of 100, the index was 4 points above July and 11 points below August, 1945, the last wartime month.

ELECTRICITY—Reflecting increased industrial activity with a resultant increase in electric power usage, the distribution of electricity in the United States in September, 1946, was 10 per cent greater than in the corresponding month last year. The uptrend in electric power distribution has continued in spite of the electric power strike at Pittsburgh.

COAL—Production of bituminous coal continued high through the week ended Sept. 28 when estimated output was 12,600,000 tons, an increase over the previous week's 12,335,000 tons. This year's production through Sept. 28 had risen to within 11.3 per cent of that for the corresponding period of 1945.

BUILDING COSTS—Basic industrial building costs in the third quarter of 1946 rose 5 points on the index prepared by the Austin Co., Cleveland. The third quarter index figure was 152 per cent of the 1926 average of 100, compared with 147 per cent in the second quarter of this year. At 152, the index is within 1 point of the all-time peak of 153 in the first quarter of 1920. The 5-point increase was attributed largely to wage increases in the construction trades and supplying industries.

RAILROADS—Class I railroads of the United States had an estimated net income in August of $51 million, compared with $51,151,731 in August, 1945. However, their net income for the first eight months of 1946 was far less favorable than that for the like period last year, the estimated net income through August this year being only $55,400,000, compared with $443,932,588 in the corresponding period of 1945. Substantial deficits were incurred in three of the eight months in 1946.



The Index (see chart above): Latest Week (preliminary) 154 Previous Week 153 Month Ago 138

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)§	90.5	90.5	85.5	82
Electric Power Distributed (million kilowatt hours)	4,478	4,518	4,184	4,028
Bituminous Coal Production (daily av.—1000 tons)	2,100	2,056	2,083	1,842
Petroleum Production (daily av.—1000 bbls.)	4,737	4,777	4,800	3,621
Construction Volume (ENR—Unit $1,000,000)	$133.7	$84.1	$86.1	$74.7
Automobile and Truck Output (Ward's—number units)	90,165	85,495	72,535	9,500

* Dates on request. § 1946 weekly capacity is 1,762,381 net tons. 1945 weekly capacity was 1,831,636 net tons.

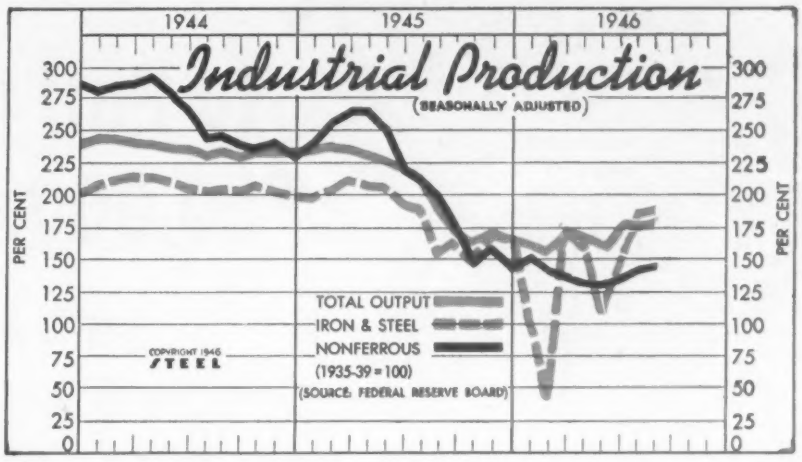
TRADE				
Freight Carloadings (unit—1000 cars)	916†	916	794	768
Business Failures (Dun & Bradstreet, number)	28	28	14	13
Money in Circulation (in millions of dollars)‡	$28,526	$28,448	$28,506	$27,853
Department Store Sales (change from like wk. a yr. ago)‡	+23%	+27%	+45%	+7%

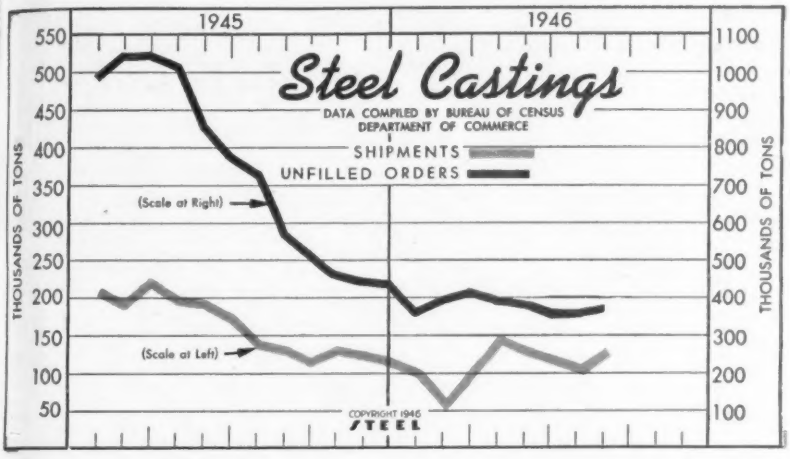
† Preliminary. ‡ Federal Reserve Board.

Federal Reserve Board's Production Indexes

(1935-39=100)

	Total Production		Iron, Steel		Nonferrous	
	1946	1945	1946	1945	1946	1945
Jan.	159	234	105	197	150	240
Feb.	153	236	43	202	141	257
Mar.	168	235	169	210	133	265
Apr.	165	231	159	206	132	264
May	159	226	109	204	130	251
June	171	220	154	192	135	219
July	172	211	179	187	143	210
Aug.	176	187	183	155	146	198
Sept.	...	171	...	163	...	176
Oct.	...	163	...	146	...	147
Nov.	...	168	...	167	...	159
Dec.	...	164	...	165	...	144
Avge.	...	204	...	183	...	211





Commercial Steel Castings

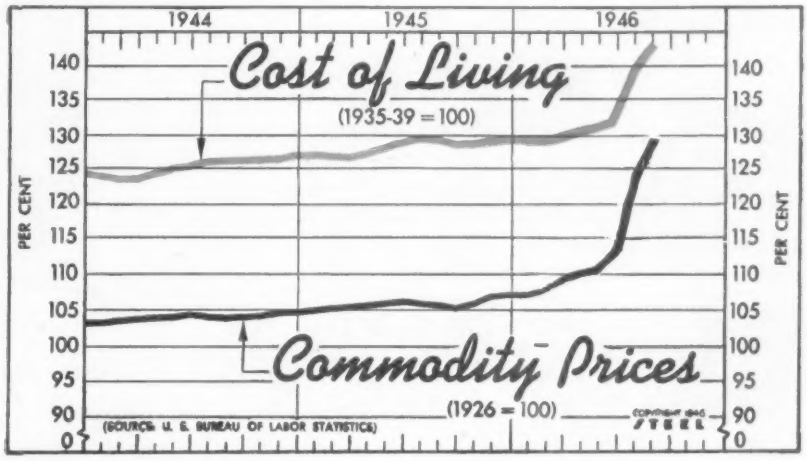
(Net tons in thousands)

	Shipments		Unfilled Orders*	
	1946	1945	1946	1945
Jan.	99.1	210.2	358.9	983.1
Feb.	57.4	191.4	390.1	1,045.4
Mar.	101.4	222.6	412.3	1,047.7
Apr.	146.3	197.7	392.8	1,018.9
May	129.2	192.9	381.7	852.9
June	123.6	173.7	361.3	776.3
July	119.2	139.3	362.6	728.4
Aug.	130.4	131.4	374.7	565.6
Sept.	....	114.6	....	513.8
Oct.	....	130.3	....	460.3
Nov.	....	123.0	....	443.8
Dec.	....	115.2	....	434.3

*Castings for sale.

Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926=100)			—Living Cost— (1935-39=100)		
	1946	1945	1944	1946	1945	1944
Jan.	107.1	104.9	103.3	129.9	127.1	124.2
Feb.	107.7	105.2	103.6	129.6	126.9	123.8
Mar.	108.9	105.3	103.8	130.2	126.8	123.8
Apr.	110.2	105.7	103.9	131.1	127.1	124.6
May	111.0	106.0	104.0	131.7	128.1	125.1
June	112.9	106.1	104.3	133.3	129.0	125.4
July	124.3	105.9	104.1	141.0	129.4	126.1
Aug.	129.1	105.7	103.9	143.7	129.3	126.4
Sept.	....	105.2	104.0	....	128.9	126.5
Oct.	....	105.9	104.1	....	128.9	126.5
Nov.	....	106.8	104.4	....	129.3	126.6
Dec.	....	107.1	104.7	....	129.9	127.0
Ave.	....	105.8	104.0	....	128.4	125.5



FINANCE

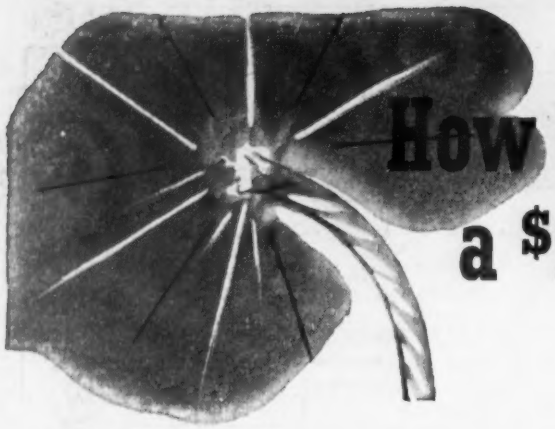
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$12,429	$12,425	$10,055	$11,425
Federal Gross Debt (billions)	$263.8	$265.6	$266.0	$262.4
Bond Volume, NYSE (millions)	$24.0	$35.4	$28.1	$31.8
Stocks Sales, NYSE (thousands)	5,115	8,422	10,559	8,744
Loans and Investments (billions)†	$59.1	$59.4	$60.0	$61.3
United States Gov't. Obligations Held (millions)†	$39,990	$40,525	$41,463	$45,140

† Member banks, Federal Reserve System.

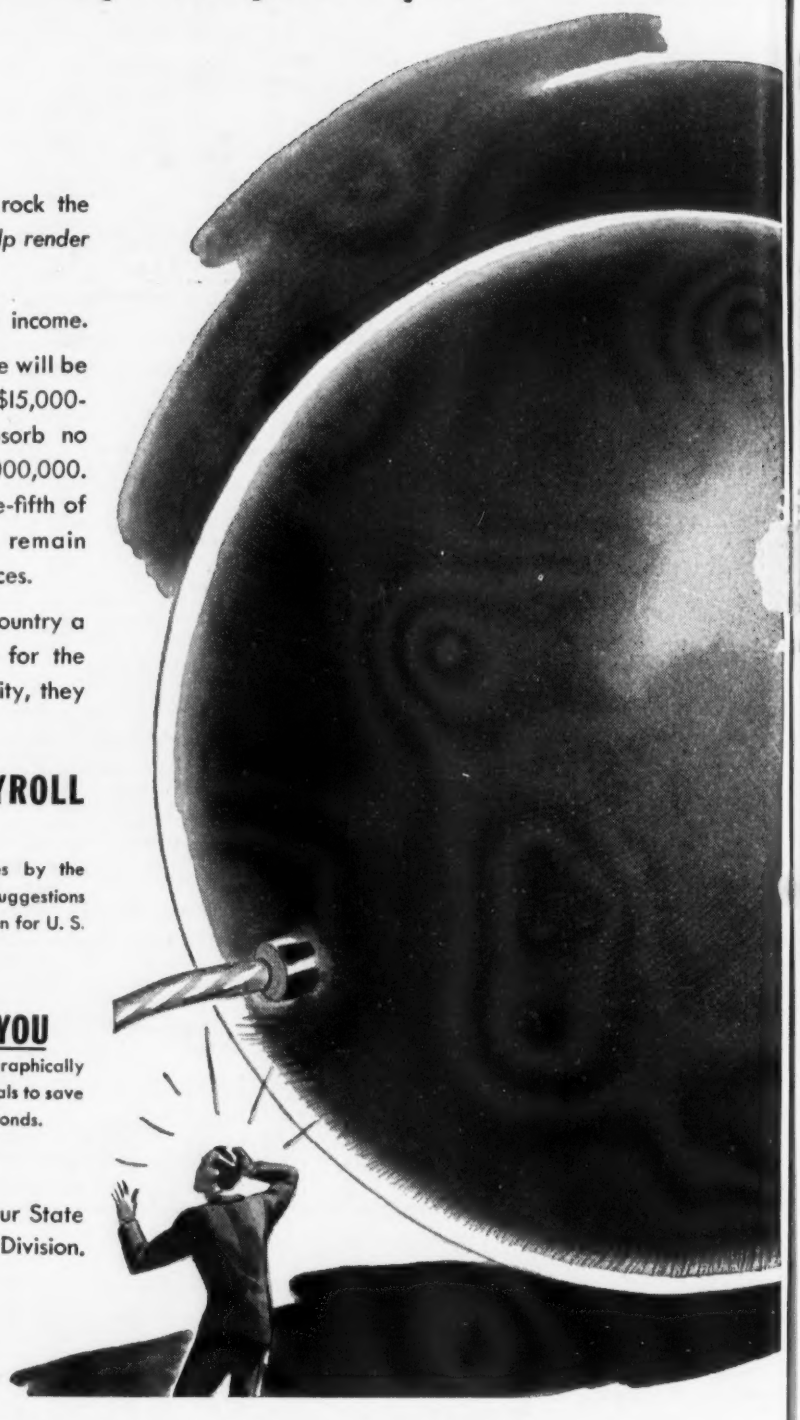
PRICES

STEEL's composite finished steel price average	$64.45	$64.45	$64.45	$58.27
All Commodities†	124.4	123.8	128.2	105.0
Industrial Raw Materials†	143.6	142.5	142.6	115.7
Manufactured Products†	117.5	117.1	124.5	101.8

† Bureau of Labor Statistics Index, 1926 = 100.



How to Pull the Fuse from a $20,000,000,000 Bomb



IMAGINE a super bomb whose explosion could rock the entire nation. Such a bomb EXISTS—*but you can help render it harmless.*

This bomb is $20,000,000,000 surplus national income.

Authorities estimate that this year's total income will be $155,000,000,000—personal taxes will total $15,000-000,000—consumer goods and services will absorb no more than $120,000,000,000. This leaves $20,000,000,000. Even if banks and insurance companies absorb one-fifth of the surplus (as they did in 1945), there will still remain $16,000,000,000 that could be used to bid up prices.

You're doing yourself, your company, and your country a favor by continuing your payroll deduction plan for the regular purchase of U. S. Savings Bonds. At maturity, they pay $4 for every $3 invested!

THE PEACETIME PAYROLL SAVINGS PLAN—

A booklet, published for key executives by the Treasury Department, containing helpful suggestions on the conduct of your payroll savings plan for U. S. Savings Bonds.

THIS TIME IT'S FOR YOU

A booklet for employees . . . explaining graphically how the payroll savings plan works . . . goals to save for, and how to reach them with Savings Bonds.

Are you using these booklets?

If not, or if you want additional copies, just ask your State Director of the Treasury Department Savings Bonds Division.

The Treasury Department acknowledges with appreciation the publication of this message by

STEEL

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council

Advertisement

OCTOBER, 1946

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by Bridgeport Brass Co. "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*

Stress Corrosion Cracking Can Be Prevented

Stress corrosion cracking, which occurs in many materials is quite mysterious because failure seems to occur for no apparent reason at a stress far below what is considered a safe load measured in accordance with accepted standards of safety.

Stress corrosion cracking or embrittlement is neither confined to one kind of material nor to one kind of corrosive medium. For example, carbon steel is affected by certain caustic solutions; stainless steel by acid chlorides; aluminum and magnesium by sea water; plastics by certain solvents; rubber by oxidation and *copper alloys by ammonia*. But it is necessary that the material be under sufficiently high tensile stresses which may be of either an internal or external nature. Here we will confine ourselves to stress corrosion cracking in relation to copper-base alloys, and methods of prevention.

When stress corrosion cracking occurs in yellow brass articles such as lighting fixtures, ash trays or similar household items, it is not of too much consequence from an engineering standpoint but nevertheless such failures should be prevented from the high quality angle. However, materials used for structural purposes must be immune to failure from stress corrosion cracking since such failures can be costly and may endanger life and limb. Although much has been published on this subject it is apparent that insufficient attention is being given to the fundamental causes which produce failure from stress corrosion cracking.

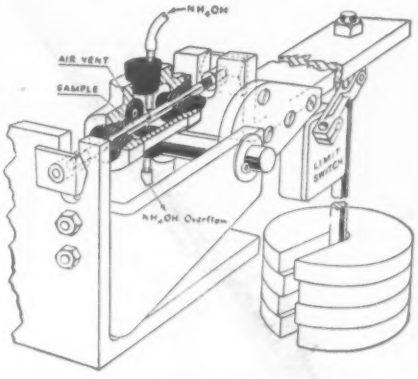
The *combinations of conditions* which may lead to failure of copper-base alloys from stress corrosion cracking are as follows:

1. The existence of high tensile stresses (a) within the metal as a result of cold working operations, or (b) external tensile stresses such as occur in tightly screwed bolts, hanger rods, etc.
2. The presence of moist ammonia even in traces so slight that it cannot be detected by sense of smell, together with air or oxygen.
3. Susceptibility of the material itself varies with its composition.
4. The element of time.

If any of the above factors is removed the danger from season cracking is greatly reduced.

Let us analyze the four points which, when taken together, do the damage. First, the existence of high tensile stresses within the metal. It is possible by low temperature heat treatment to reduce internal stresses to a safe value without softening the metal. Tensile stresses resulting from the application of external forces cannot generally be avoided. Here an engineering alloy which is least susceptible to stress corrosion cracking should be used.

Point number two indicates the vast importance of the presence of moist ammonia even in traces so slight that it cannot be detected by sense of smell. It is surprising how much damage a small amount of ammonia can do to yellow brass. Since the quantity need not be enough to affect the sense of smell its presence is not often recognized. Ammonia occurs in the atmosphere as a result of the decomposition of protein and organic and inorganic substances containing Nitrogen. It is evident therefore that ammonia is present in the atmosphere almost everywhere. It has even been detected during the bright dipping operation when nitric acid solutions are used to clean brass. Nessler's reagent furnishes a very sensitive test for the presence of ammonia.



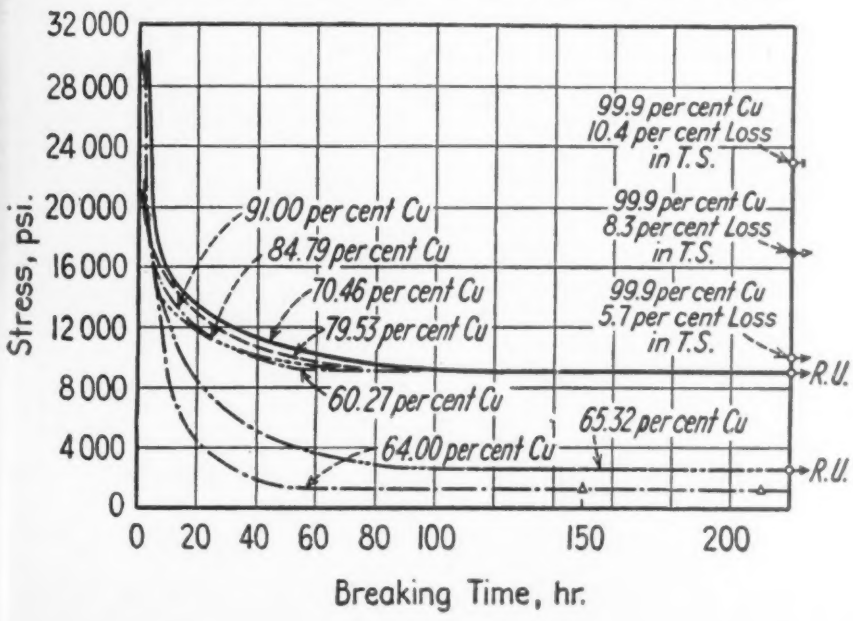
Cut-away drawing showing details of stress-corrosion testing apparatus.

Ammonia gas has a great thirst for water. Even a trace of ammonia in the atmosphere will be absorbed by moisture resulting from condensation on the surface of cold metal objects. Once we are aware of the damages from ammonia, precautions can be taken to prevent its presence or steps can be taken to use materials of construction which are most immune to the effects of ammonia.

The degree of susceptibility to stress corrosion or season cracking is related to the composition of the alloys. Pure copper, and high copper alloys such as those containing tin, brasses containing a low percentage of zinc, copper-silicon alloys with low silicon content and copper-nickel alloys are most resistant. Brasses low in

(Continued on Page 2, Col. 1)

Copper Zinc series — Stress versus breaking time in ammonia hydroxide vapors.



Stress Corrosion Cracking Can Be Prevented

(Continued from Page 1)

copper and high in zinc are most susceptible.

Point four deals with the element of time. Stress corrosion failures are not sudden. It takes time for all four factors involved to produce failure. The higher the stresses, the greater the concentration of ammonia, and the more sensitive the material, the shorter the time for failure to occur. Failures can be reduced by shortening the period of storage under unfavorable conditions such as in damp cellars or outdoors.

To determine the susceptibility of various materials to stress corrosion cracking Bridgeport uses laboratory tests involving

Aluminum Brass subjected to ammonia test. Note cracks across grains.

special equipment designed for this purpose. Samples of various alloys are maintained under definite tensile stresses while enveloped in an ammonia atmosphere. The chart is typical for various brasses with different copper and zinc contents. It shows that with the exception of 66-34, and 65-35, brass alloys ranging from 60-40 to 95-5 require tensile stresses in excess of 8,000 psi before stress corrosion becomes a serious factor.

Nomenclature

In answer to the question "what is the difference between stress corrosion cracking and season cracking," the end results are the same. In the case of stress corrosion cracking, the stresses which affect the material are of an external nature. With season cracking the stresses involved are of an internal nature such as are found in articles in the hard or unannealed condition resulting from cold working such as drawing, stamping, spinning or forming.

More detailed information on this subject can be obtained in the article "Stress-Corrosion Testing of Copper-Base Alloys" by C. L. Bulow which was published jointly in 1945 by the American Society for Testing Materials and by the American Institute of Mining and Metallurgical Engineers. A reprint of the article will be furnished upon request.

In closing we wish to emphasize that stress corrosion cracking as related to copper-base alloys can be eliminated by understanding the combination of causes which produce failure. Obviously the use of copper-base engineering alloys for structural purposes especially for outdoor construction is indicated. Among these are Duronze V (98% copper, 2% silicon) silicon bronze for bolts, nuts, nails, fasteners and other screw products. Phosphor bronze and Cupro Nickel are also high on the list because of their great resistance to stress corrosion cracking.

New Technical Bulletin on Bridgeport's Duplex Tubing Available

It contains complete, up-to-the-minute data on applications, advantages, recommendations and methods of installation. This bulletin will prove extremely helpful to users of heat exchangers, condensers, evaporators, stills and other chemical and industrial processing equipment where the tubing is subject to different types of corrosion on inside and outside walls. Technical Bulletin No. 746 will be forwarded on request. Please use company letterhead.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

New Die Casting Machine has been announced which is used for casting magnesium, aluminum and copper alloys. Manufacturer states these high pressure casting machines have mold clamping, metal injection, core pulling and ejecting units operated by hydraulic pressure. Injection capacities from 12½ to 100 cubic inches per minute. Pressures from 6,000 to 50,000 psi are available. **No. 717**

Tube Flaring Tool has been developed which, it is claimed, will quickly select the size that is required for all jobs in hand tool flaring. Performs single flare, double flare and swedging operations to suit all requirements. **No. 718**

Electronic Counter which can be connected to any type of electrically-operated production machine is said to indicate and, if desired, permanently record number of times machine performs specific operation or produces standard part throughout selected period of time. Also records time required to make each piece and down time of machine. **No. 719**

Rotary Shaft Seal has been announced which the manufacturer states will exclude all foreign material. Available for shaft sizes from ½ to 1 inch or for other sizes upon request. No packing or special tools are said to be required. **No. 720**

New Metal-Cutting Chart is said to offer complete information needed in cutting any metal. Indicates number of teeth per inch for hand blades and correct pitch, speed and feed power for power blades. Also gives tension readings for torque wrench and fixed tension devices. **No. 721**

Threading Tool Retractor has been developed which is designed to separate tool bit from work at precisely same point each time thread is cut or chased. Said to be adaptable to any bench-type lathe with up to 12-inch swing and having threading facilities. Recommended for production runs where threads must run up to shoulder. **No. 722**

Drill Jig is being offered which manufacturer claims will expedite cross-drilling operations on round, square or hexagonal stock. Unit actuated by spindle of drill press which permits operator to feed and unload work without giving undue attention to job or its operation. **No. 723**

New Overspeed Tachometer recently announced is said to be equipped for overspeed testing of turbines, generators and motors. Completely portable and accurate to 0.25 per cent. Two ranges for testing: 1700 to 2200 rpm and 3400 to 4400 rpm. **No. 724**

BRASS, BRONZE, COPPER, DURONZE, NICKEL SILVER, CUPRO NICKEL

Warehouse Service in Principal Cities

STRIP AND SHEET—For drawing, stamping, forming, spinning. Leaded alloys for machining, drilling, tapping. Silicon bronze, phosphor bronze for corrosion resistance. Alloys suitable for springs. Engravers' copper and brass.

WIRE—Cold Heading alloys for screws, bolts, nuts, nails, fastenings, electrical connectors, Phono-Electric trolley and contact wires.

ROD—Alloys for screw machine operation. Duronze III high strength, corrosion-resistant, good for machining and hot forging. Hot forging and cold heading alloys. Welding Rods. Copper-covered ground rod.

TUBING—For miscellaneous fabrication. For condensers and heat exchangers. For water, air, oil and hydraulic lines.

DUPLEX TUBING—for conditions too severe for a single metal or alloy.

PIPE—Brass and copper for plumbing.

FABRICATED GOODS—Plumbing brass goods. Radiator air valves. Aer-a-sol insecticide dispensers. Automobile tire valves.

TECHNICAL SERVICE—Staff of experienced, laboratory-trained men available to help customers with their metal problems.

WAREHOUSE SERVICE—Warehouse and jobbers stocks available for prompt delivery in principal cities.

TECHNICAL LITERATURE — Manuals and handbooks available for most products.

"Bridgeport" BRASS

BRIDGEPORT BRASS

BRIDGEPORT BRASS COMPANY BRIDGEPORT 2 CONN. • ESTABLISHED 1865

Mill Books Being Opened For Deliveries Next Year

Most products now being entered, though first quarter capacity is limited . . . Shortage of raw materials threatens production

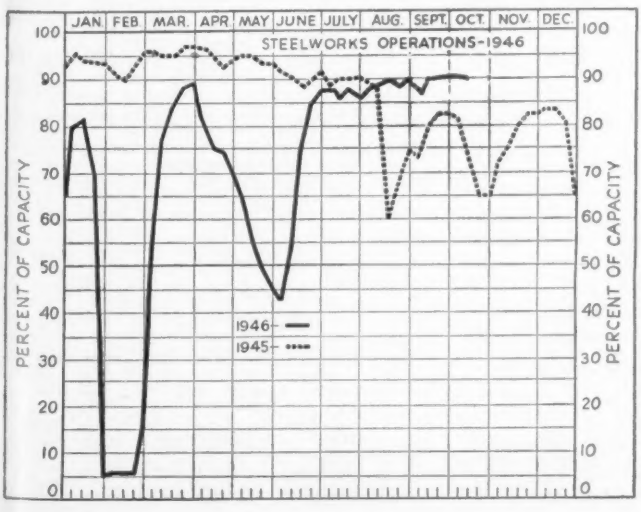
ORDERS for an increasing number of steel products are now being accepted by producers for 1947 delivery, shapes and hot-rolled carbon bars being the latest and most important to be added to the list. Except for the major light flat products and certain descriptions of pipe and wire, some business in all lines of finished steel is being entered for delivery next year. This does not mean that all producers have opened books to their general trade but that one or more representative mills in each line have done so and that others are becoming increasingly disposed to take similar action.

Even in the principal grades of sheets, hot and cold-rolled and galvanized, action in some quarters is expected before this week is over. Tonnage already is being accepted for first quarter in stainless sheets and some other sheet specialties and also in cold narrow strip.

In shapes and hot-rolled carbon bars, noted above as newly added to the list, some scattered tonnages had been accepted previously, with requirements for identified projects, including certain freight car programs. However, until recently there had been no opening of books for next year to the general trade in these two products.

In thus taking orders for next year sellers in general are paring down consumer quotas, in most cases to dissatisfaction of the consumer. At the same time, however, they note that some are taking the reductions in good grace and that some important consumers indicate they require less, because of scarcity in other materials and components.

Disposition to open books for 1947 is due more to near approach of the new year than to any clarification of the outlook for the remainder of this year. Prospects for maintaining production over the final quarter are still uncertain.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Oct. 12	Change	Same Week 1945	Same Week 1944
Pittsburgh	97.5	None	62	92
Chicago	91	None	86	96.5
Eastern Pa.	78	— 3	75	93
Youngstown	90	None	50	87
Wheeling	93.5	+ 7.5	88	97
Cleveland	87.5	— 3.5	79	92
Buffalo	90.5	None	86	86
Birmingham	99	None	95	90
New England	92	None	82	89
Cincinnati	84	+ 6	77	88
St. Louis	72.5	None	68	75
Detroit	60	—16	84	84
Estimated national rate	90	— 0.5	73.5	95.5

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

Despite the success in maintaining production over recent weeks at a high rate in the face of shortage of raw materials, there still is a feeling that this can be continued only a certain time without improvement in supply, which is not in early prospect.

So long as present OPA policy prevails the scrap situation is expected to become worse before it improves. Further, emphasis now being placed on foundry iron for housing materials is reflected in a smaller output of basic iron for steelmaking and at the same time there is a generally increasing shortage of metallurgical coke. All this is restricting production and in absence of any relief, not now foreseen, will shorten it further. Depressing effect of the scrap shortage on steelmaking operations is noted particularly in the eastern seaboard area where leading mills refuse to accept upgraded scrap.

While there is clearer conception of the extent of rated housing tonnage for fourth quarter the question of freight car steel is under discussion, with further conferences in Washington last week. Allocations of steel for export for the four months beginning with November are resulting in shifting of schedules in various products.

Steelworks operations dropped ½-point last week, to an estimated 90 per cent of capacity, mainly due to a decline at Detroit, where Ford Motor Co. suffered shutdown of its open hearths because of a strike of cranemen. Eastern Pennsylvania also lost some ground because of scrap shortage. Other districts showed little change. Cincinnati gained 6 points to 84 and Wheeling 7½ points to 93½. Eastern Pennsylvania lost 3 points to 78, Detroit 16 points to 60 per cent, from a revised rate of 76 the preceding week and Cleveland 3½ points to 87½. Other districts were unchanged, as follows: Chicago, 91, Youngstown 90, St. Louis 72½, Birmingham 99, New England 92, Pittsburgh 97½, Buffalo 90½ and West Coast 84.

In absence of any changes in Office of Price Administration ceilings average composite prices of steel and iron products are unchanged at recent levels. Finished steel composite is $64.45, semifinished steel $40.60, steelmaking pig iron $27.50 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Oct. 12	Oct. 5	Sept. 28	One Month Ago Sept., 1946	Three Months Ago July, 1946	One Year Ago Oct., 1945	Five Years Ago Oct., 1941
Finished Steel	$64.45	$64.45	$64.45	$64.45	$64.45	$58.27	$56.73
Semifinished Steel	40.60	40.60	40.60	40.60	40.60	37.80	36.00
Steelmaking Pig Iron	27.50	27.50	27.50	27.50	27.50	24.19	23.00
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. **Semifinished Steel Composite:**—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. **Steelmaking Pig Iron Composite:**—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. **Steelworks Scrap Composite:**—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Oct. 12, 1946	Sept., 1946	July, 1946	Oct., 1945
Steel bars, Pittsburgh	2.50c	2.50c	2.50c	2.25c
Steel bars, Philadelphia	2.86	2.86	2.86	2.57
Steel bars, Chicago	2.50	2.50	2.50	2.25
Shapes, Pittsburgh	2.35	2.35	2.35	2.10
Shapes, Philadelphia	2.48	2.48	2.48	2.215
Shapes, Chicago	2.35	2.35	2.35	2.10
Plates, Pittsburgh	2.50	2.50	2.50	2.25
Plates, Philadelphia	2.558	2.558	2.558	2.30
Plates, Chicago	2.50	2.50	2.50	2.25
Sheets, hot rolled, Pittsburgh	2.425	2.425	2.425	2.20
Sheets, cold-rolled, Pittsburgh	3.275	3.275	3.275	3.05
Sheets, No. 24 galv., Pittsburgh	4.05	4.05	4.05	3.70
Sheets, hot-rolled, Gary	2.425	2.425	2.425	2.20
Sheets, cold-rolled, Gary	3.275	3.275	3.275	3.05
Sheets, No. 24 galv., Gary	4.05	4.05	4.05	3.70
Hot-rolled strip, over 6 to 12-in., Pitts.	2.35	2.35	2.35	2.10
Cold-rolled strip, Pittsburgh	3.05	3.05	3.05	2.80
Bright basic, bess. wire, Pittsburgh	3.05	3.05	3.05	2.75
Wire nails, Pittsburgh	3.75	3.75	3.75	2.90
Tin plate, per base box, Pittsburgh	$5.25	$5.25	$5.25	$5.00

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$38.00	$38.00	$38.00	$36.00
Slabs, Pittsburgh, Chicago	39.00	39.00	39.00	36.00
Rerolling billets, Pittsburgh	39.00	39.00	39.00	36.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.30c	2.30c	2.30c	2.15c

Pig Iron

	Oct. 12, 1946	Sept., 1946	*July, 1946	Oct., 1945
Bessemer del. Pittsburgh	$29.77	$29.77	$27.69	$26.35
Basic, Valley	28.00	28.00	26.00	24.65
Basic, eastern del. Philadelphia	29.93	29.93	27.93	26.53
No. 2 fdry., del. Pgh. N. & S. sides	29.27	29.27	27.19	25.85
No. 2 foundry, Chicago	28.50	28.50	26.50	25.19
Southern No. 2, Birmingham	24.88	24.88	22.88	21.57
Southern No. 2, del. Cincinnati	28.94	28.94	26.94	25.50
No. 2 fdry., del. Philadelphia	30.43	30.43	28.43	27.03
Malleable, Valley	28.50	28.50	26.50	25.15
Malleable, Chicago	28.50	28.50	26.50	25.19
Charcoal, low phos., fob Lyles, Tenn.	33.00	33.00	33.00	33.00
Gray forge, del McKees Rocks, Pa.	28.61	28.61	28.61	25.49
Ferromanganese, fob cars, Pittsburgh	140.00	140.00	140.00	140.26

Scrap

Heavy melting steel, No.1, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt, steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	25.00	23.75	20.00	20.00

Coke

Connellsville, furnace ovens	$8.75	$8.75	$8.75	$7.50
Connellsville, foundry ovens	9.50	9.50	9.50	8.25
Chicago, by-product fdry., del.	15.10	15.10	15.10	13.75

* $2 higher on bessemer, basic, foundry and malleable on adjustable pricing contracts.

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight. Pricing on rails was changed to net ton basis as of Feb. 15, 1946.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, $33, fob mill; forging quality, $38, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop, $48.69.

Rerolling, Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $39; Detroit, del., $41.50; Duluth (bill.), $41; Pac. ports (bill.), $51.50. (Andrews Steel Co., carbon slabs, $41; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Granite City Steel Co., $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $47; Detroit, del., $49.50; Duluth, billets, $49; forging billets fob Pac., ports, $59.50.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 fob Toronto, O.; Geneva Steel Co., $64.64, Pacific ports.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $58.43; del. Detroit $60.93; del. eastern Mich. $61.93.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $38. (Empire Sheet & Tin Plate Co., Mansfield, O., carbon, sheet bars, $39, fob mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb, 2.05c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—⅜ in. inclusive, per 100 lb, $2.30. Do., over ⅜—⅝-in., incl., $2.45; Galveston, base, $2.40 and $2.55, respectively. Worcester add $0.10; Pacific ports $0.535.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.50c; Duluth, base, 2.60c; Detroit, del., 2.635c; eastern Mich., 2.685c; New York, del., 2.86c; Phila., del., 2.86c; Gulf ports, dock, 2.885c; Pac. ports, dock, 3.185c. (Sheffield Steel Corp. may quote 2.75c, fob St. Louis; Joslyn Mfg. & Supply Co., 2.55c, fob Chicago.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.921c; Detroit, del., 3.056c. (Texas Steel Co. may use Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.108	4300	$1.839
2300	1.839	4600	1.298
2500	2.759	4800	2.326
3000	0.541	5100	0.379
3100	0 920	5130 or 5152	0.494
3200	1.461	6120 or 6152	1.028
3400	3.462	6145 or 6150	1.298
4000	0.487	8612	0.703
4100 (.15-.25 Mo)	0.757	8720	0.757
(.20-.30 Mo)	0.812	9830	1.407

* Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.10c; Detroit, 3.15c; Toledo, 3.25c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.625c; Detroit, del., 3.76c; eastern Mich., 3.79c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.35c; Detroit, del., 2.485c; eastern Mich. and Toledo, 2.535c; Gulf ports, dock, 2.735c; Pacific ports, dock, 2.785c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.35c; Detroit, del., 2.485c; eastern Mich. and Toledo, del., 2.535c; Gulf ports, dock, 2.735c.

Iron Bars: Single refined, Pitts., 4.76c; double refined, 5.84c; Pittsburgh, staybolt, 6.22c; Terre Haute, single ref., 5.42c; double ref., 6.76c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base, 2.425c; Granite City, base, 2.525c; Detroit, del., 2.56c; eastern Mich., del., 2.61c; Phila., del., 2.615c; New York, del., 2.685c; Pacific ports, 3.01c. (Andrews Steel Co. may quote hot-rolled sheets for shipment to the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 3.00c on hot carbon sheets, Sparrows Point, Md.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.275c; Granite City, base, 3.375c; Detroit, del., 3.41c; eastern Mich., del., 3.46c; New York, del., 3.615c; Phila., del., 3.635c; Pacific ports, 3.96c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 4.05c; Granite City, base, 4.15c; New York, del., 4.31c; Phila., del., 4.24c; Pacific ports, 4.635c.

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29-gage, per square, 3.73c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16-gage not corrugated, copper alloy, 4.15c; Granite City, 4.25c; Pacific ports, 4.635c; copper iron, 4.50c; pure iron, 4.50c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.60c.

Aluminized Sheets, 20 gage: Pittsburgh, hot-dipped, coils or cut to lengths 9.00c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.20c; Granite City, base 3.30c; Detroit, del., 3.335c; eastern Mich., 3.385c; Pacific ports, 3.885c; 20-gage: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.80c; Detroit, del., 3.935c; eastern Mich., 3.985c; Pacific ports, 4.485c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.90c	4.685c	4.00c
Armature	4.25c	5.035c	4.35c
Electrical	4.75c	5.535c	4.85c
Motor	5.425c	6.21c	5.525c
Dynamo	6.125c	6.91c	6.225c
Transformer			
72	6.625c	7.41c	.....
65	7.625c	8.41c	.....
58	8.125c	8.91c	.....
52	8.925c	9.71c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary Cleveland, Birmingham, Youngstown, Middletown, 6-in. and narrower: Base, 2.45c; Detroit, del., 2.585c; eastern Mich., del., 2.635c; Pacific ports, 3.135c. (Superior Steel Corp. may quote 3.30c, Pitts.)
Over 6-in.: Base, 2.35c; Detroit, del., 2.485c; eastern Mich., del., 2.535c; Pacific ports, 3.035c. (Superior Steel Corp. may quote 3.20c, Pitts.)

Cold-Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less, 3.05c; Chicago, base, 3.15c; Detroit, del., 3.185c; eastern Mich., del., 3.235c; Worcester, base, 3.25c. (Superior Steel Corp. may quote 4.70c, Pitts.)

Cold-Finished Spring Steel: Pittsburgh, Cleveland base, 0.26-0.50 carbon, 3.03c. Add 0.20c for Worcester.

Tin, Terne Plate

(OPA ceiling prices announced March 1, 1946.)
Tin Plate: Pittsburgh, Chicago, Gary, 100-lb base box, $5.25; Granite City, Birmingham, Sparrows Point, $5.35.
Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb base box 0.25 lb tin, $4.60; 0.50 lb tin, $4.75; 0.75 lb tin, $4.90; Granite City, Birmingham, Sparrows Point, $4.70, $4.85, $5.00, respectively.
Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29-gage and lighter, 3.30c; Granite City, Birmingham, Sparrows Point, 3.40c; Pacific ports, boxed, 4.335c.
Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted, 4.05c; Pacific ports, 4.835c.
Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box, $4.55; Granite City, Birmingham, Sparrows Point, $4.65.
Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I. C. 8-lb $12.50; 15-lb $14.50; 20-lb $15.50 (nom.); 40-lb $20.00 (nom.).

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.50c; New York, del., 2.71c; Phila., del., 2.558c; St. Louis, 2.74c; Boston, del., 2.86c; Pacific ports, 3.085c; Gulf ports, 2.885c.
(Granite City Steel Co. may quote carbon plates 2.65c fob DPC mill; Geneva Steel Co., Provo, Utah, 3.20c fob Pac. ports; Central Iron & Steel Co., Harrisburg, Pa., 2.80c, basing points; Lukens Steel Co., Coatesville, Pa., 2.75c, base; Worth Steel Co., Claymont, Del., 2.60c, base; Alan Wood Steel Co., Conshohocken, Pa., 2.75c base.)
Floor Plates: Pittsburgh, Chicago, 3.75c; Pacific ports, 4.435c; Gulf ports, 4.135c.
Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.787c; Gulf ports, 4.308c; Pacific ports, 4.525c.
Clad Steel Plates: Coatesville, 10% cladding: nickel-clad, 18.72c; inconel-clad, 26.00c; monel-clad, 24.96c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.35c; New York, del., 2.54c; Phila., del., 2.48c; Pacific ports, 3.035c; Gulf ports, 2.735c.
(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.60c, Bethlehem, Pa., on the general range and 2.70c on beams and channels from 4 to 10 inches.)
Steel Piling: Pittsburgh, Chicago, Buffalo, 2.65c; Pacific ports, 3.235c.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham, per 100 pounds)

Wire to Manufacturers in carloads	
Bright, basic or bessemer	*$3.05
Spring (except Birmingham)	*$4.00
Wire Products to Trade	
Nails and staples	
Standard and cement-coated	†$3.75
Galvanized	‡$3.40
Wire, Merchant Quality	
Annealed	§$3.50
Galvanized	§$3.85

(Fob Pittsburgh, Chicago, Cleveland, Birmingham, per base column)

Woven fence, 15½ gage and heavier	72
Barbed wire, 80-rod spool	**79
Barbless wire, twisted	**79
Fence posts	74
Bale ties, single loop	72½

*Add $0.10 for Worcester, $0.05 for Duluth and $0.535 for Pacific ports.
†Add $0.30 for Worcester, $0.535 for Pacific ports. Nichols Wire & Steel may quote $4.25; Pittsburgh Steel Co., $4.10.
‡Add $0.535 for Pacific ports.
§Add $0.10 for Worcester; $0.735 Pacific ports.
**Pittsburgh Steel Co. may quote 89.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Welded

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	53	30	½	21	0½
¼ & ⅜	56	37½	⅝	27	7
½	60½	48	1-1¼	31	13
¾	63½	52	1½	35	15½
1-3	65½	54½	2	34½	15

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	58	46½	1¼	20	0½
2½-3	61	49½	1½	25½	7
3½-6	63	51½	2	27½	9
7-8	62	49½	2½-3½	28½	11½
9-10	61½	49	4	30½	15
11-12	60½	48	4½-8	29½	14
			9-12	25¼	9

Boiler Tubes: Net base prices per 100 feet fob Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Elec. Weld— Hot Rolled	Cold Rolled
1"	13	....	$9.90	$9.36	$9.65
1¼"	13	....	11.73	9.63	11.43
1½"	13	$10.91	12.96	10.63	12.64
1¾"	13	12.41	14.75	12.10	14.37
2"	13	13.90	16.52	13.53	16.19
2¼"	13	15.50	18.42	15.06	18.03
2½"	12	17.07	20.28	16.57	19.83
2½"	12	18.70	22.21	18.11	21.68
2¾"	12	19.82	23.54	19.17	22.95
3"	12	20.79	24.71	20.05	24.02
3½"	11	26.24	31.18	25.30	30.29
4"	10	32.56	38.68	31.32	37.52
4½"	9	43.16	51.29	....	....
5"	9	49.96	59.36	....	....
6"	7	76.71	91.14	....	....

Pipe, Cast Iron: Class B, 6-in. and over, $60 per net ton, Birmingham; $65, Burlington, N. J.; $62.80, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Rails, Supplies

Standard rails, over 60-lb, fob mill, net ton, $43.40. Light rails (billet), Pittsburgh, Chicago, Birmingham, net ton, $49.18.
Relaying rails, 35 lb and over, fob railroad and basing points, $31-$33.
Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates $51 net ton, base, Standard spikes, 3.65c.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago. Additional discounts: 5 for carloads; 10 for full containers, except tire, step and plow bolts.
(Ceiling prices advanced 12 per cent, effective July 27, 1946; discounts remain unchanged.)

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ¾ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages, nuts separate, 71-10 off, nuts attached, 71 off; bulk, 80 off on 15,000 of 3-in and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-in. and smaller	..	64
½-in. and smaller	62	..
⅝-in.-1-in.	..	60
⅞-in.-1-in.	59	..
1⅛-in.-1½-in.	57	58
1⅝-in. and larger	56	..

Additional discount of 10 for full kegs.

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset 1-in. and smaller	71 off
Headless, ¼-in. and larger	60 off
No. 10 and smaller	70 off

Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

Structural	4.75c
⅞-inch and under	*65-5 off

*Plus 12 per cent increase on base prices, effective July 26.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $2.75-$3.00 off

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	....	72.49c
1.5	4	1	8.5	58.43c
....	4	2	3	58.43c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Base, Cents per lb

CHROMIUM NICKEL STEELS

	Bars	Plates	Sheets	H.R. Strip	C.R. Strip
302	25.96c	29.21c	36.79c	23.93c	30.30c
303	28.13	31.38	38.95	29.21	35.71
304	27.05	31.38	38.95	25.45	32.46
308	31.38	36.79	44.36	30.84	37.87
309	38.95	43.28	50.85	40.03	50.85
310	53.02	56.26	57.35	52.74	60.59
312	38.95	43.28	53.02	....	....
*316	43.28	47.61	51.94	43.28	51.94
§321	31.38	36.79	44.36	31.65	41.12
†347	35.71	41.12	48.69	35.71	45.44
431	20.56	23.80	31.38	18.94	24.35

STRAIGHT CHROMIUM STEEL

403	23.93	26.51	31.92	22.99	29.21
**410	20.02	23.93	28.67	18.39	23.80
416	20.56	23.80	29.21	19.75	25.45
††420	25.96	30.84	36.25	25.70	39.49
430	20.56	23.80	31.38	18.94	24.35
‡‡430F	21.10	24.35	31.92	20.29	26.51
440A	25.96	30.84	36.25	25.70	39.49
442	24.35	27.59	35.17	25.96	34.62
443	24.35	27.59	35.17	25.96	34.62
446	29.76	33.00	39.19	37.87	56.26
501	8.66	12.98	17.04	12.98	18.39
502	9.74	14.07	18.12	14.07	19.48

STAINLESS CLAD STEEL (20%)
(Fob Pittsburgh and Washington, Pa., plate prices include annealing and pickling.)

304	....	19.48	20.56	....	....
410	....	17.31	18.39	....	....
430	....	17.85	18.94	....	....
446	....	19.48	20.56	....	....

* With 2-3% molybdenum. § With titanium. † With columbium. ** Plus machining agent. †† High carbon. ‡‡ Free machining.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens	
Connellsville, furnace	*$8.75
Connellsville, foundry	9.25- 9.75
New River, foundry	10.25-10.50
Wise county, foundry	9.00- 9.50
Wise county, furnace	8.50- 9.00
By-Product Foundry	
Kearney, N. J., ovens	14.40
Chicago, outside delivered	14.35
Chicago, delivered	15.10
Terre Haute, delivered	14.85
Milwaukee, ovens	15.10
New England, delivered	16.00
St. Louis, delivered	†15.10
Birmingham, delivered	12.25
Indianapolis, delivered	14.85
Cincinnati, delivered	14.60
Cleveland, delivered	14.55
Buffalo delivered	14.75
Detroit, delivered	15.10
Philadelphia, delivered	14.68

* Operators of hand-drawn ovens using trucked coal may charge $9.35; retroactive to May 17, 1946, on adjustable pricing.
† 15.68 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal, freight allowed east of Omaha.	
Pure and 90% benzol	15.00c
Toluol, two degree	22.00c
Industrial xylol	22.00c
Per pound fob works	
Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c
Eastern plants, per pound	
Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.00c
Per ton, bulk, fob plants	
Sulphate of ammonia	$30.00

WAREHOUSE STEEL PRICES

Base delivered prices, cents per pound, for delivery within switching limits, subject to established extras. Quotations based on mill prices announced March 1, 1946

	Hot-rolled bars	Structural shapes	Plates	Floor plates	Hot-rolled sheets (No. 10-gage base)	Hot-rolled strip (14-gage and lighter 6-in and narrower)	Hot-rolled strip (12-gage and heavier wider than 6-inch)	Galvanized flat sheets (24-gage base)	Cold-rolled sheets (17-gage base)	Cold-finished bars	Cold-rolled strip
Boston	4.356[1]	4.203[1]	4.203[1]	6.039[1]	4.050[1]	5.548[1]	4.418[1]	5.725[14]	5.031[14]	4.656[21]	4.965
New York	4.134[1]	4.038[1]	4.049[1]	5.875[1]	3.856[1]	4.375[1]	4.275[1]	5.501[13]	4.838[14]	4.584[21]	5.075
Jersey City	4.155[1]	4.018[1]	4.049[1]	5.875[1]	3.856[1]	4.375[1]	4.275[1]	5.501[13]	4.890[14]	4.605[21]	5.075
Philadelphia	4.114[1]	3.937[1]	3.875[1]	5.564[1]	3.774[1]	4.664[1]	4.554[1]	5.499[13]	5.139[28]	4.564[21]	5.064
Baltimore	4.093[1]	4.05[1]	3.865[1]	5.543[1]	3.64[1]	4.293[1]	4.193[1]	5.365[17]	5.118[20]	4.543[21]	.....
Washington	4.232[1]	4.23[1]	4.067[1]	5.632[1]	3.842[1]	4.432[1]	4.332[1]	5.667[17]	5.007[24]	4.532[21]	.....
Norfolk, Va.	4.377[1]	4.303[1]	4.262[1]	5.777[1]	4.037[1]	4.927[1]	4.477[1]	5.862[17]	4.552[24]	4.677[21]	.....
Bethlehem, Pa.*	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.70[1]	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.60[1]	3.65[1]	3.92[1]	5.55[1]	3.575[1]	4.21[1]	4.11[1]	5.20[15]	4.625[16]	4.20[21]	4.96
Buffalo (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[15]	4.525[16]	4.10[21]	4.60
Pittsburgh (city)	3.60[1]	3.65[1]	3.65[1]	5.25[1]	3.575[1]	3.95[1]	3.850[1]	5.327[13]	4.625[24]	4.20[21]	4.70
Pittsburgh (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[13]	4.525[24]	4.10[21]	4.60
Cleveland (city)	3.60[1]	3.88[1]	3.65[1]	5.48[1]	3.575[1]	3.95[1]	3.850[1]	5.347[13]	4.625[24]	4.20[21]	4.70
Cleveland (country)	3.50[1]	.....	3.55[1]	.....	3.475[1]	3.85[1]	3.750[1]	.....	4.525[24]	4.10[21]	4.00
Detroit	3.735[1]	3.987[1]	3.935[1]	5.607[1]	3.710[1]	4.085[1]	3.985[1]	5.526[15]	4.760[24]	4.25[12]	4.985
Omaha (city, del.)	4.32[1]	4.37[1]	4.37[1]	5.97[1]	4.045[1]	4.52[1]	4.42[1]	6.00[16]	5.72[24]	4.945[21]	.....
Omaha (country)	4.22[1]	4.27[1]	4.27[1]	5.87[1]	3.945[1]	4.42[1]	4.32[1]	5.90[16]	.....	.....	.....
Cincinnati	3.902[1]	3.983[1]	3.952[1]	5.583[1]	3.671[1]	4.046[1]	3.946[1]	5.296[13]	4.271[24]	4.602[21]	.....
Youngstown*	.....	.....	.....	.....	.....	.....	.....	4.85[13]	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.475[1]	3.85[1]	3.750[1]	5.10[13]	.....	.....	.....
Chicago (city)	3.75[1]	3.80[1]	3.80[1]	5.40[1]	3.475[1]	3.95[1]	3.850[1]	†5.40[15]	4.425[24]	4.20[21]	4.90
Milwaukee	3.908[1]	3.958[1]	3.958[1]	5.558[1]	3.633[1]	4.108[1]	4.008[1]	†5.558[15]	4.583[24]	4.358[21]	5.058
Indianapolis	3.83[1]	3.88[1]	3.88[1]	5.48[1]	3.743[1]	4.118[1]	4.018[1]	5.368[15]	4.793[24]	4.43[21]	5.060
St. Paul	4.092[2]	4.142[2]	4.142[2]	5.742[2]	3.817[2]	4.292[2]	4.192[2]	5.666[15]	4.767[24]	4.852[21]	5.398
St. Louis	3.918[1]	3.968[1]	3.968[1]	5.568[1]	3.643[1]	4.118[1]	4.018[1]	5.622[15]	4.593[24]	4.522[21]	5.222
Memphis, Tenn.	4.296[1]	4.346[1]	4.346[1]	6.071[1]	4.221[1]	4.596[1]	4.496[1]	5.746[15]	.....	4.821[21]	.....
Birmingham	3.75[1]	3.80[1]	3.80[1]	6.153[1]	3.675[1]	4.05[1]	4.05[1]	5.20[15]	5.077[24]	4.99[21]	5.465
New Orleans (city)	4.358[1]	4.408[1]	4.408[1]	6.329[1]	4.283[1]	4.658[1]	.....	5.808[15]	5.304[24]	5.079[21]	.....
Houston, Tex.	4.00[3]	4.50[1]	4.50[1]	5.75[3]	3.988[3]	4.668[3]	4.563[3]	5.763[24]	5.819[10]	4.10[21]	.....
Los Angeles	4.65[4]	4.90[4]	5.20[4]	7.45[4]	5.225[4]	5.30[4]	5.200[4]	6.55[12]	7.425[3]	6.033[21]	5.868
San Francisco	4.20[7]	4.15[7]	4.15[7]	5.85[7]	4.125[7]	5.85[1]	4.50[1]	6.35[15]	6.875[15]	5.783[21]	7.588
Portland, Oreg.	4.70[27]	4.70[27]	5.00[27]	6.75[27]	4.875[27]	6.65[27]	5.000[27]	6.20[15]	6.825[15]	5.983[15]	.....
Tacoma, Wash.	4.60[6]	4.70[6]	5.00[6]	6.75[6]	4.87[6]	5.80[6]	4.60[6]	6.40[15]	6.55[15]	6.23[21]	.....
Seattle	4.60[6]	4.70[6]	5.00[6]	6.75[6]	4.87[6]	5.80[6]	4.60[6]	6.40[15]	6.55[15]	6.23[21]	.....

*Basing point cities with quotations representing mill prices, plus warehouse spread; †open market price.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [20]—one to six bundles; [21]—100 to 749 pounds; [24]—300 to 1999 pounds; [27]—1500 to 39,999 pounds; [28]—1500 to 1999 pounds; [30]—1000 to 39,999 pounds; [34]—400 to 1499 pounds; [35]—1000 to 1999 pounds; [36]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [37]—300 to 4999 pounds.

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.45
Mesabi nonbessemer	5.05
High phosphorus	5.05
Mesabi bessemer	5.20
Old range nonbessemer	5.30

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.	Nom.
N. African low phos.	Nom.
Swedish basic, 60 to 68%	13.00
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$39.75
48% 3:1	41.00
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	$33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	$28.30
48% no ratio	31.00
48% 3:1 lump	41.00

Domestic (seller's nearest rail)

48% 3:1	$43.50

less $7 freight allowance.

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 15c to 17c per unit less than Metal Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent					
	Carbon	Mn	Si	Cr	Ni	Mo
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30

Basic open-hearth Electric furnaces			
Bars per 100 lb	Billets per GT	Bars per 100 lb	Billets per GT
$0.812	$16.230	$1.353	$27.050
.812	16.230	1.353	27.050
.866	17.312	1.407	28.132
.703	14.066	1.244	24.886
1.298	25.968	1.677	33.542
1.298	25.968	1.677	33.542

Extras are in addition to a base price of 2.921c. per pound on finished products and $58.43 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

PIG IRON

Maximum prices per gross ton fixed by OPA schedule No. 10, last amended July 27, 1946; $2 increase may be charged on adjustable pricing contracts made between May 29 and July 27. Delivered prices do not include 3 per cent federal tax, effective Dec. 1, 1942.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$29.50	$29.00	$30.50	$30.00
Newark, N. J., del.	31.20	30.70	32.20	31.70
Brooklyn, N. Y., del.	32.28	....	....	32.78
Birdsboro, Pa., base	29.50	29.00	30.50	30.00
Birmingham, base	24.88	23.50	29.50	....
Baltimore, del.	30.22	....	....	....
Boston, del.	29.68	....	....	....
Chicago, del.	28.72	....	....	....
Cincinnati, del.	28.94	28.06	....	....
Cleveland, del.	28.62	27.74	....	....
Newark, N. J.	30.82	....	....	....
Philadelphia, del.	30.05	29.55	....	....
St. Louis, del.	28.62	29.54	....	....
Buffalo, base	28.50	27.50	29.50	29.00
Boston, del.	30.06	29.56	31.06	30.56
Rochester, del.	30.03	....	31.03	30.53
Syracuse, del.	30.58	....	31.58	31.08
Chicago, base	28.50	28.00	29.00	28.50
Milwaukee, del.	29.73	29.23	30.23	29.73
Muskegon, Mich., del.	32.05	....	....	32.05
Cleveland, base	28.50	28.00	29.00	28.50
Akron, Canton, del.	30.04	29.54	30.54	30.04
Detroit, base	28.50	28.00	29.00	28.50
Saginaw, Mich., del.	30.81	30.31	31.31	30.81
Duluth, base	29.00	28.50	29.50	29.00
St. Paul, del.	31.13	30.63	31.63	31.13
Erie, Pa., base	28.50	28.00	29.50	29.00
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.06	29.56	31.06	30.56
Granite City, Ill., base	28.50	28.00	29.00	28.50
St. Louis, del.	29.00	28.50	....	29.00
Hamilton, O., base	28.50	28.00	....	28.50
Cincinnati, del.	29.68	29.18	....	29.68
Neville Island, Pa., base	28.50	28.00	29.00	28.50
*Pittsburgh, del., N.&S. sides	29.27	28.77	29.77	29.27
Provo, Utah, base	26.50	26.00	....	....
Sharpsville, Pa., base	28.50	28.00	29.00	28.50
Sparrows Point, base	29.50	29.00	....	....
Baltimore, del.	30.60	....	....	....
Steelton, Pa., base	....	29.00	....	....
Swedeland, Pa., base	29.50	29.00	30.50	30.00
Philadelphia, del.	30.43	29.93	....	30.93
Toledo, O., base	28.50	28.00	29.00	28.50
Youngstown, O., base	28.50	28.00	29.00	28.50
Mansfield, O., del.	30.66	30.16	31.16	30.66

*To Neville Island base add: 61c for McKees Rocks, Pa.; 93c Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.24, Oakmont, Verona; $1.38, Brackenridge.

Exceptions to above prices: Struthers Iron & Steel Co., Struthers, O., may charge 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron. Republic Steel Corp. may quote $2 a ton higher for foundry and basic pig iron on the Birmingham base.

High Silicon, Silvery

6.00-6.50 per cent (base) $34.00
6.51-7.00 .. $35.00 9.01- 9.50 .. 40.00
7.01-7.50 .. 36.00 9.51-10.00 .. 41.00
7.51-8.00 .. 37.00 10.01-10.50 .. 42.00
8.01-8.50 .. 38.00 10.51-11.00 .. 43.00
8.51-9.00 .. 39.00 11.01-11.50 .. 44.00

Fob Jackson county, O., per gross ton. Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01 to 14.50%, $50 Jackson co.; each additional 0.50% silicon up to and including 18% add $1; low impurities not exceeding 0.005 P, 0.40 Si, 1.0% C, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus.

Fob furnace, Lyles, Tenn. $33.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $28.00
Valley base 28.00

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $34.00 base; $35.38, del., Philadelphia. Intermediate phosphorus, Central Furnace, Cleveland, $31.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point
Net prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $81.00

High Heat Duty

Pa., Ill., Md., Mo., Ky. 65.00
Ala., Ga. 65.00
N. J. 70.00

Intermediate Heat Duty

Ohio 57.00
Pa., Ill., Md., Mo., Ky. 59.00
Ala., Ga. 51.00
N. J. 62.00

Low Heat Duty

Pa., Md., Ohio 51.00

Malleable Bung Brick

All bases 75.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press 42.00
Wire Cut 40.00

Silica Brick

Pennsylvania 65.00
Joliet, E. Chicago 74.00
Birmingham, Ala. 65.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.
Bulk 22.00
Bags 26.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.
Chrome brick 54.00
Chem. bonded chrome 54.00
Magnesite brick 76.00
Chem. bonded magnesite 65.00

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net ton, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

Open Market Prices of Leading Ferroalloy Products

Spiegeleisen: 19-21% carlot per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products Co. is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140 fob cars, Pittsburgh (where Carnegie-Illinois Steel Corp. is producer); add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.55c; regular, 21.05c; medium, 15.75c. Prices are per pound contained Mn. bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) per lb of briquets. Contract, carlots, bulk 0.0605c, packed 0.063c, tons 0.0655c, less 0.068c, eastern, freight allowed; 0.063c, 0.0655c, 0.0755c and 0.078c, central; 0.066c, 0.0685c, 0.0855c and 0.088c, western; spot up 0.25c.

Ferrotungsten: Spot 10,000 lb or more, per lb contained W, $1.90; contract, $1.88; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V 35-55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb. contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.65c, ton lots 13.10c, smaller lots 13.50c; 80-90% c.l. 10.35c, ton lots 10.85c, smaller lots 11.35c; 75% c.l. 9.40c, ton lots 9.95c, smaller lots 10.45c; 50% c.l. 7.90c, ton lots 8.50c, smaller lots 9.10c. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%. Deduct 0.85c for bulk carlots.

Ferro-Boron: (B 17.50% min., Si 1.50% max., Al 0.50% max. and C 0.50% max.) per lb of alloy contract ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60% per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices up 10 cents.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 15.05c, ton lots 15.55c; central zone, add 0.40c and 0.65c; western zone, add 0.5c and 1.85c; **high carbon, high nitrogen,** add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c, add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C about 5-7%): Contract, lump packed, eastern zone, freight allowed, c.l. 15.60c, ton lots 16.10c, less than ton 16.75c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.85c for smaller lots. Deduct 0.55c for bulk carlots.

S. M. Ferrochrome, high carbon (Cr 60-65%, Si, Mn and C 4-6% each): Contract, lump, packed, eastern zone, freight allowed, c.l. 16.15c, ton lots 16.65c, less ton 17.30c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.05c for smaller lots. Prices are per lb of contained chromium; spot prices 0.25c higher. Deduct 0.55c for bulk carlots.

S.M. Ferrochrome, low carbon; (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.15c ton lots 21.00c, less ton lots 22.00c eastern, freight allowed, per pound contained chromium, 20.40c, 20.50c, 20.95c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb. Cr, packed eastern zone, c.l. 9.50c, ton lots 9.50c less than ton 10.10c, central zone, add 0.3c for c.l. and 0.5c for smaller lots; western zone, add 0.70c for c.l. and 2c for smaller lots. Deduct 0.30c for bulk carlots. Prices per lb of briquets; spot prices 0.25c higher.

Chromium Metal: 97% min chromium, max. 0.50% carbon, eastern zone, per lb contained chromium bulk, c.l., 79.50c, 2000 lb to c.l. 80c, central 81c and 82.60c; western 82.25c and 84.75c; fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract ton lots or more $1.35, less, $1.60, pound of metal; $1.36 and $1.61

central, $1.40 and $1.65, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

Calcium-Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb. of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l., 12.90c; 2000 lb to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% Si and max. 2% Fe, eastern, bulk; c.l., 12.50c, 2000 lb to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb. Mn and about ½ lb. Si, eastern zone, bulk, c.l. 5.80c, ton lots 6.35c; central zone, add 0.25c for c.l. and 1c for ton lots; western, add 0.55c for c.l. and 0.20c for ton lots. **Ferrosilicon,** weighing about 5 lb. and containing exactly 2 lb. Si, or about 2½ lb. and containing exactly 1 lb. Si, packed, eastern zone, c.l. 3.90c, ton lots 4.15c, less ton lots 4.45c; central zone, add 0.15c for c.l. and 0.40c for smaller lots; western zone, add 0.30c for c.l. and 0.45c for smaller lots. Prices are f.o.b. shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.30c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l., 30c, 2000 lb to c.l., 32c, central, 30.25c, and 33c; western, 30.55c and 35.05c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) per lb of alloy. Contract ton lots, $1.89, less $2.01, eastern; freight allowed; $1.903 and $2.023, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance), per lb of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 ton, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si, $6.25 lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c lb; less-ton lots, 50c lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up 0.25c.

Silvaz Alloy: (Si 35-40%, Va 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up 0.25c.

SMZ Alloy: (Si 60-55%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) per lb of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 0.25c.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) per lb of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c, 12.50c and 13.00c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up 0.25c.

Zirconium Alloy: 12-15%, per lb of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot up $5 per ton.

Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot up ½c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) contract basis fob Niagara Falls, N. Y., lump per lb 5.88c; ton lots 6.38c; less 6.88c. Spot up ½c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, less-ton lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 97%, $2.50-$2.60; freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 99-92% V_2O_5 and 5.84% NA_2O; or air dried, 88-85% V_2O_5 and 5.15% NA_2O, $1.10 per lb contained V_2O_5, fob plant, freight allowed on quantities of 25 lb and over to St. Louis.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, delivered at consumer's plant except where noted. For complete OPA price schedule refer to MPR-4

OPEN HEARTH AND BLAST FURNACE GRADES

	—Heavy Melting—			—Bundles—						
	No. 1	No. 2	No. 1 Busheling	No. 1	No. 2	No. 3	Machine Shop Turnings	Mixed Borings, Turnings	Short Shovel Turnings	Cast Iron Borings
†New York	15.33	15.33	15.33	....	15.33	13.33	10.33	10.33	12.33	....
Philadelphia	18.75	18.75	18.75	18.75	18.75	16.75	13.75	13.75	15.75	14.75
*Boston	14.06	14.06	14.06	14.06	14.06	....	9.06	9.06	11.06	....
Cleveland	19.50	19.50	19.50	19.50	19.50		14.50	14.50	16.50	13.50-14.00
Pittsburgh	20.00	20.00	20.00	20.00	20.00	18.00	15.00	15.00	17.00	16.00
Valley	20.00	....	....	20.00	....	....	15.00	....	17.00	16.00
Mansfield	....	....	....	....	....	....	15.00	....	....	....
Chicago	18.75	18.75	18.75	18.75	18.75	16.75	13.75	13.75	15.75	14.75
Buffalo	19.25	19.25	19.25	19.25	19.25		14.25	14.25	16.25	15.25
‡Detroit	17.32	....	17.32	17.32	17.32	15.32	12.32	12.32	14.32	13.32
St. Louis	17.50	....	....	....	....	....	10.50		12.50	....
Cincinnati	19.50	19.50	....	19.50	19.50	....	10.50-11.00	10.50-11.00	12.50-13.00	11.50-12.00
Birmingham	17.00	17.00	17.00		17.00	15.00		....	12.00	13.00
San Francisco	17.00	17.00	17.00	17.00	17.00	9.00	7.00	....	....	....
Seattle	14.50	14.50	....		....	....			....	....
Los Angeles	14.00	13.00	....	12.00	12.00	....	5.50	5.50	....	....

ELECTRIC FURNACE, FOUNDRY AND SPECIAL GRADES

	Bar Crops and Plate	Cast Steel	Punchings and Plate Scrap	Electric Furnace Bundles	Heavy Turnings	Alloy Free Turnings	Cut Structural and Plate Scrap 1 ft and under	Cut Structural and Plate Scrap 2 ft and under	No. 1 Chemical Cast Iron Borings	Tin Can Bundles
Philadelphia	21.25	21.25	21.25	19.75	18.25	....	21.25		*16.51	....
†New York	....	....	17.83	16.33	....	....	17.83	17.33	14.33	....
*Boston	....	....	....	....	....	....	....	....	13.31	....
Cleveland	22.00		22.00	20.50						
Pittsburgh	22.50	22.50	22.50	21.00	19.50	18.00	22.50	22.00	19.00	16.00
Chicago	....	....	21.25	....	....	....	....	....	....	....
‡Detroit	....	....	19.82	18.32	....	....	....	....	....	....
Birmingham	15.50		....	....	....	....	19.00	18.50	....	
San Francisco	15.50	15.50	....	....	....	7.00	18.00	17.50	....	14.50

STEEL GRADES OF RAILROAD ORIGIN

	No. 1 Heavy Melting R.R. Steel	Railroad Malleable	Axles	Rails: Rerolling	Rails: Random Lengths	Rails: Cut 3-ft and under	Rails: Cut 18-in. and under	Railroad Specialties	Uncut Tires	Angles, Splice Bars
Pittsburgh	21.00	22.00	26.00	23.50	21.50	23.50	24.75	24.50	23.50	23.50
Valley	21.00	....	....	....	....	....	....	....	....	....
†Chicago	19.75	22.00	....	22.25	20.25	22.25	23.50	22.75	....	22.25
St. Louis	....	22.00	24.50	21.00	19.00	21.50	....	....	21.00	21.00
Cincinnati	....	....	....		20.50-21.00	....	....	....	....	....
Birmingham	....	....	24.00	20.50	18.50	....	....	....	....	20.50
San Francisco	....	....	24.00	....	18.50	....	....	....	20.50	....
Seattle	14.50	....	....	....	....	....	....	....	....	....

CAST IRON GRADES

	No. 1 Cupola Cast	Charging Box Cast	Heavy Breakable Cast	Stove Plate	Unstripped Motor Blocks	Malleable	Brake Shoes	Clean Auto Cast	No. 1 Wheels	Burnt Cast
†New York	25.00	21.00	20.00	23.00	20.00	24.00	....	....	....	....
*Philadelphia	25.00	21.00	20.00		20.00	24.00	17.75	27.00	22.00	....
*Boston	25.00		20.00	23.00				27.00		
Buffalo	25.00	21.00	20.00	23.00	20.00	24.00	17.75	27.00	22.00	17.75
Cleveland	25.00		20.00							
*Pittsburgh	25.00	21.00	20.00	23.00	20.00	24.00	17.75	27.00	22.00	17.75
Los Angeles	25.00	....	....	....	....		....		....	....
*Chicago	25.00	....	....	....	....	24.00	....	....	....	....
‡Detroit	25.00	....	20.00	....	....	....	....	27.00	....	....
*St. Louis	25.00	21.00	20.00	23.00	....	....	17.75	27.00	22.00	17.75
Cincinnati	25.00	....	20.00	23.00	....	....	....	....	....	....
Birmingham	25.00	....	20.00	23.00	20.00	....	17.75	....	22.00	....
*Seattle	25.00	....	....	....	....	....	....	....	....	....

* Fob shipping point; † fob trucks; ‡ dealers buying prices.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 14.37½c, del. Conn.; less carlots 14.50c, refinery. Dealers may add ¼c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, 14.12½c, refinery, 20,000 lb or more; 14.37½c, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 15.50c; 88-10-2 (No. 215) 18.75c; 80-10-10 (No. 305) 18.25c; No. 1 yellow (No. 405) 12.50c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis; high grade 9.25c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb. 0.4c; under 2000 lb 0.50c.

Lead: Common 8.10c, chemical 8.20c, corroding, 8.20c, E. St. Louis for carlots; add 5 points for Chicago, Minneapolis- St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland - Akron - Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston - Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 13.25c; No. 12 foundry alloy (No. 2 grade) 13.25c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 14.50c; grade 2 (92-95%) 13.25c; grade 3 (90-92%) 12.25c; grade 4 (85-90%) 11.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 27.50c, carlots; 29.50c 100 lb to c.l.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; and 2c for 223 lb and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, fob refinery 35.00c lb; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c.

Mercury: Open market, spot, New York, $98-$99 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.25 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.30.

Cobalt: 97-99%, $1.50 lb, for 550 lb (bbl.); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y. 90.12½c per ounce.

Platinum: $86.50 per ounce.

Palladium: $24 per troy ounce.

Iridium: $125 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 14.37½c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 25.81c; yellow brass 23.67c; commercial bronze, 95% 26.14c, 90% 25.81c; red brass, 85% 24.98c, 80% 24.66c; best quality 24.38c; phosphor bronze, grade A 4% or 5%, 43.45c; Everdur, Duronze or equiv., hot rolled, 30.88c; naval brass 28.53c; manganese bronze 31.99c; muntz metal 26.78c; nickel silver 5% 32.38c.

Rods: Copper, hot rolled 22.16c, cold drawn 23.16c; yellow brass 18.53c; commercial bronze, 95% 25.83c, 90% 25.50c; red brass, 85% 24.67c; 80% 24.35c; best quality 24.07c; phosphor bronze, grade A 4% or 5% 43.70c; Everdur, Duronze or equiv. cold drawn, 29.82c; naval brass 22.59c; manganese bronze 25.93c; muntz metal 22.34c; nickel silver 5% 34.44c.

Seamless Tubing: Copper 25.85c; yellow brass 26.43c; commercial bronze 90% 28.22c; red brass 85% 27.64c, 80% 27.32c; best quality brass 26.79c; phosphor bronze, grade A 5% 44.70c.

Copper Wire: Bare, soft, fob eastern mills, carlots 19.89c, less carlots 20.39c; weatherproof, fob eastern mills carlot 22.07c, less carlots 22.57c; magnet, delivered, carlots, 23.30c, 15,000 lb or more 23.55c, less carlots 24.05c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 11.25c; cut sheets 11.50c; pipe 9.90c, New York, 10.00c Philadelphia, Baltimore, Rochester and Buffalo, 10.50c Chicago, Cleveland, Worcester and Boston.

Zinc Products: Sheet fob mill, 13.15c, 36,000 lb and over deduct 7%. Ribbon and strip 12.25c, 3000-lb lots deduct 1%, 6000 lb 2%, 9000 lb 3%, 18,000 lb 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lb 12.50c; 100-500 lb 13.00c; under 100 lb 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

PLATING MATERIALS

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lb to 1 ton 17.75c; under 400 lb 18.25c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval over 15 in., 25.125c; curved, 20.375c; round oval straight, 19.375c; electro-deposited, 18.875c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels 20.50c.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls 34.00c, fob, Niagara Falls.

Sodium Cyanide: 96%, 200-lb drums 15.00c; 10,000-lb lots 13.00c fob Niagara Falls.

Nickel Anodes: 500-2999 lb lots; cast and rolled carbonized 47.00c; rolled depolarized 48.00c.

Nickel Chloride: 100-lb kegs or 275-lb bbls 18.00c lb, del.

Tin Anodes: 1000 lb and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb bbls 39.00c, fob Graselli, N. J.; 100-lb kegs 39.50c.

Sodium Stannate: 100 or 300-lb drums 36.50c, del.; ton lots 35.50c.

Zinc Cyanide: 100-lb kegs or bbls 33.00c fob Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	12.000	12.000	11.250
Yellow brass	9.875	9.625	9.125
Commercial bronze			
95%	11.250	11.000	10.500
90%	11.125	10.875	10.375
Red Brass			
85%	10.875	10.625	10.125
80%	10.875	10.625	10.125
Best quality (71-79%)	10.500	10.250	9.750
Muntz metal	9.250	9.000	8.500
Nickel silver, 5%	10.500	10.250	.....
Phos. br., A, B, 5%	12.750	12.500	11.500
Naval brass	9.500	9.250	8.750
Manganese bronze	9.500	9.250	8.750

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are fob shipping point; add ¾c for shipment of 60,000 lb of one group and ½c for 20,000 lb of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper and copper borings 11.50c; No. 2 copper wire and mixed heavy copper, copper tuyeres 10.50c.

(Group 2) Soft red brass and borings, aluminum bronze 10.75c; copper-nickel solids and borings 11.00c; lined car boxes, cocks and faucets 9.50c; bell metal 17.25c; babbitt-lined brass bushings 14.75c.

(Group 3) Admiralty condenser tubes, brass pipe 8.75c; muntz metal condenser tubes 8.25c; old rolled brass 8.25c; manganese bronze solids; (lead 0%-0.40%) 8.00c; (lead 0.41%-1%) 7.00c; manganese bronze borings, 7.25c.

Aluminum Scrap: Price fob point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb, 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50c, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb borings and turnings one cent less than segregated.

Lead Scrap: Prices fob point of shipment. For soft and hard lead, including cable lead, deduct 0.75c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.75c, fob point of shipment, add ½c for 10,000 lb or more. New die cast scrap 4.95c, radiator grilles 4.95c, add ½c for 20,000 lb or more. Unsweated zinc dross, die cast slab 5.80c, any quantity.

Nickel, Monel Scrap: Prices fob point of shipment; add ½c for 2000 lb or more of nickel or cupro-nickel shipped at one time and 20,000 lb or more of monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 23.00c; 90-98% nickel, 23.00c per lb nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb contained nickel, plus 8.00c per lb contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; solder sheet 18.00c.

Sheets, Strip . . .

Books opening for first quarter, with capacity now reduced by carryover load; stainless is easy

Sheet & Strip Prices, Page 178

New York — Most sheet sellers are now in position to make a better appraisal of their situation for the remainder of this year, with a result that they soon will be able to make more definite promises on steel for shipment after the turn of the year. In most cases they are certain that they will have a heavy carryover and that they will not have much capacity to devote to orders beyond that. Some, expecting a continuation of the ratings into next year on about the same basis as they are now being set up for the current quarter, are confident that they will have nothing available for first quarter beyond their carryover and such rated tonnage as they may receive for that period.

In some lines, such as stainless steel and one or two other specialties, most producers have already opened books for first quarter, as indicated in previous issues. They have been able to open books on these items because they were not as scarce as others.

However, on hot and cold-rolled sheets and galvanized it has been difficult for mills to gage the situation for the pressure has been so great, and it appears as if there will be no appreciable easing before second quarter at least. At that time the situation in cold-rolled sheets may be eased somewhat by completion of new facilities now under way. There may also be some improvement in the position of electrical sheets for the same reason. However, there appears to be sufficient demand in most sheet products to absorb whatever new capacity may be brought in for some time to come.

Philadelphia—Sheet sellers are receiving numerous orders for first quarter in hot and cold-rolled and galvanized material but, pending opening of books, these are not being entered. There may be some action this week, however. Contracts, meanwhile are being accepted on stainless and certain other sheet specialties.

Cincinnati — Carryover from third quarter is less perplexing to district sheet mills than schedule adjustments made necessary by rated tonnage. Although books for first quarter will not be opened until later, mills are trying to hold quotas within conservative limits to avoid clogging of books at the yearend. Despite high production a tight market well into 1947 is viewed as certain.

Cleveland — Strike against the Ohio Public Service Co. forced a curtailment of operations at finishing mills in the Warren, O., district last week. Production at Republic Steel Corp.'s sheet and strip mills in the district was curtailed about 50 per cent, one large mill having closed Monday. Unless the strike is settled promptly or substitute power source can be found, fourth quarter delivery schedules will be further complicated. These schedules were previously upset by the necessity of making provision for rated orders which account for up to 25 per cent of the total for some mills.

Chicago — Lack of sheet and strip is beginning to affect numerous manufacturing companies in this district, with some shutdowns and curtailments. More are expected shortly. This situation naturally fans out and affects operations in other plants, such as forge shops, foundries, and the like, for there is a disposition not to allow inventories of various materials to get too far out of balance. There is a slight indication that sheet and stripmakers find new business somewhat behind shipments, which would be significant if it should become a trend. Slack barrel coopers currently are more handicapped by shortage of staves than by hoops.

Pittsburgh — The Steel Industry Advisory Committee is scheduled to meet this week to discuss extension of preference ratings into first quarter. However, most steel producers expect CPA to continue priority assistance for the veterans' housing program and proven "hardship" cases through first quarter. There is even some prospect that preference rating may be extended to important reconversion industries on the West Coast and such programs as railroad car construction.

Present volume of rated tonnage is not excessive in comparison to overall finished steel production. The difficulty arises from the fact that nearly 90 per cent of priority orders represent light gage hot-rolled and galvanized sheets. Monthly carryover tonnage is expected to be sharply reduced by the end of the

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year for most interests have scheduled relatively few new orders for fourth quarter. Huge pentup demand for flat-rolled sheets is expected to more than absorb record-breaking production well into next year, but there is some indication that present pressing demand will be dissipated toward the close of first quarter as a result of prospective improvement in overall production, resulting from expansion programs nearing completion. There is also the prospect that projected schedules in many civilian goods lines may be revised downward, despite record potential demand, as a result of many companies being forced to price themselves out of a portion of their market due to suddenly rising production costs.

Boston—Fabricators using lighter gages of carbon sheets and strip are short of steel but builders of 275-gallon household fuel tanks taking No. 12 gage hot-rolled 60 x 120-inch sheets are probably most pinched in this area. Fabrication of these tanks calls for an increasing tonnage in New England. Lack of this size and gage has forced some shops to improvise, utilizing more sheets per tank. There is improvement in flat-rolled supply, still most critical of finished steel products. Some mills have opened books for next year on cold-rolled strip but with first quarter allocations reduced drastically, due to carryovers. Mills are getting more off heats because of scrap and raw material improvising, but rerollers of narrow cold strip normally holding strictly to specifications have reached a point where they will take this steel for tempering and other uses. Some producers of flat-rolled will concentrate on delinquent tonnage in December but carryovers will limit volume for first quarter, notably in narrow hot strip.

St. Louis — Shortage of bricklayers threatens to hold up operation of a new open-hearth furnace in this area which, with two others already in, was scheduled to increase production. Sheet and plate output is gaining steadily, however; 20 per cent of flat steel tonnage now is going to plates, in contrast to a normal 10 per cent. The increase was made in an attempt to satisfy demand from car builders, most of whom have reinstated orders canceled last summer during a protracted mill strike. Pressure for sheets is unremitting and a balance between capacity and demand is not forseen under two years. In this district capacity for light sheets is less than during the 30s depression. Order books have been closed since March and will not be reopened before January. A strike at a local chemical plant has created a steel mill shortage of pickling acids. One pickling unit already has been shut down, but total tonnage has not yet been seriously affected. Shortage of freight cars begins to loom as another hazard. Sheet and plate order books are filled through first half.

Birmingham—Sheets continue to present the most perplexing steel problem. Mills are turning out product at capacity and on regular schedule, but overall demand for sheets probably is greater than at any time in the history of the district. Steel mills here attribute the bottleneck in sheets not only to the unprecedented demand occasioned by war and intensified by diversification of industrial endeavor, but to allocations and a condition aggravated earlier in the year by work stoppages.

Steel Bars . . .

Barmakers take orders for first quarter more freely; alloy grade prices may be decontrolled

Bar Prices, Page 178

Pittsburgh — OPA is reported considering decontrolling alloy bar prices, with other steel specialties, such as sheet piling and tool steel. Production of alloy bars is less than half of war peak output and deliveries are available in three to four weeks on some electric furnace grades. Postwar alloy bar demand has been below expectation, due to disappointing production showing of automotive and other civilian goods industries. Except for the 8600, and to a less extent the 8700 series, demand for NE steels has dropped sharply. Due to extended deliveries on carbon bars many consumers are specifying alloy. The electric power strike here has forced a sharp drop in electric furnace steel production the past three weeks.

Philadelphia — In line with previous action on cold-drawn carbon bars and hot and cold-rolled alloys, producers are beginning to open books for first quarter on hot-rolled carbon bars. Until now acceptances of hot carbon bars for that period have been negligible, apart from scattered commitments for identified

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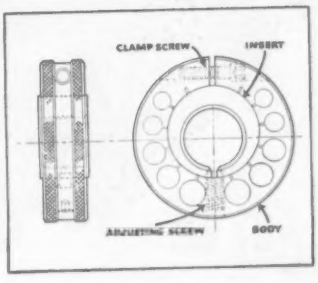

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work. However, due particularly to arrearages, most mills have relatively little first quarter capacity available in smaller sizes of hot-rolled bar stock.

Boston — Signs are not lacking to indicate consumers in some industries are becoming filled up on bars, considering shortages and unbalance in other products required for fabricating finished goods; this crops out in cold-finished carbon especially, appearing in steel estimates for first half and beyond in the textile mill equipment industry, among others. Most of these estimated requirements include less bar tonnage than expected, while for other steel products needs are frequently heavier. Notably flats in both hot and cold-drawn carbon grades are included. In small sizes, any easing in hot carbon is slight. Warehouses are also in better shape on cold-drawn. For general run of forge work, inventories are better balanced; deliveries on forgings have not slipped behind to the extent they have on most products. There is more spot buying by forge shops, but for new work, taking substantial tonnage of any size stocks are not comfortable. Some producers will ration small sizes, notably flats, which are being substituted for strip in some applications.

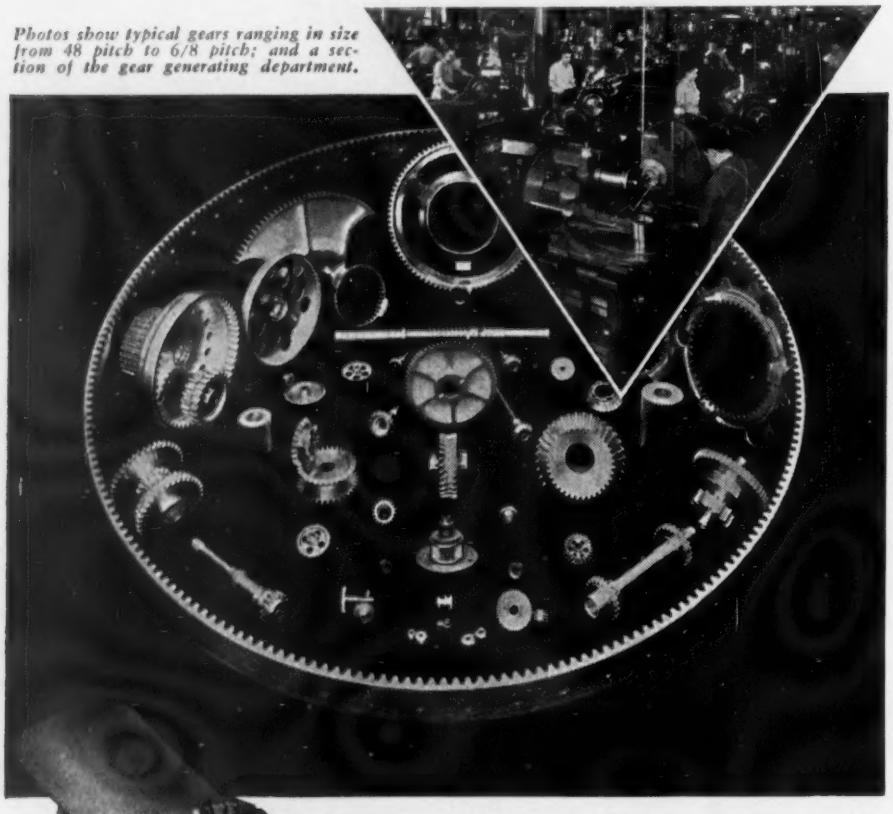
New York — Some producers, while taking no formal action, are now accepting hot carbon bar orders for next quarter on a more liberal scale. However, they are still confining tonnage to regular customers and are not accepting by any means all the tonnage that is being offered, even by these particular consumers. As noted recently, several mills have already been accepting orders for cold carbon bars for next quarter on a fairly active basis and have actually been soliciting business in alloys.

Hot carbon bar producers generally will not have much first quarter capacity in small sizes. Some, in fact, will have none, so great are their present arrearages and so poor are indications that they will make much headway on them over the closing months of this year.

St. Louis—Merchant bar deliveries remain at least six months late, although there are prospects of improvement soon unless iron, coke and scrap become scarcer. Order books are closed to all but limited tonnages for essential projects already blue-printed or under way, principally highway construction work. Schedules are beginning to work out of the chaos that characterized the last several months. Demand stays high, especially for small bars, and cancellations are virtually unknown. Steel men are somewhat surprised that the bear market and widespread predictions of a business recession have not yet shown up on order books.

Seattle — Rolling mills continue to decline new business, their first objective being to clear up current backlogs. Demand for merchant and reinforcing bars is strong, but production is not satisfactory because of labor conditions. There is no inclination to open books for first quarter as backlogs already run well into 1947.

Photos show typical gears ranging in size from 48 pitch to 6/8 pitch; and a section of the gear generating department.



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Steel Plates . . .

Deliveries becoming more extended, now into second quarter; scrap shortage handicaps mills

Plate Prices, Page 179

New York—Promises on plates are becoming further extended in most instances. While no producer has as yet accepted orders for last half of next year, some are booked up almost solidly until then and still others are booked well into second quarter. Tank fabricators and railroad equipment builders are pressing particularly hard for tonnage at this time and while they are unable, generally speaking, to place new orders for delivery during the next few months, they are getting somewhat better shipments against orders already placed, as the mills, at the urgent suggestion of CPA, are endeavoring to do what they can toward speeding up deliveries on car steel because of the critical shortage in rolling stock.

Eastern plate mills, however, are still seriously handicapped by lack of raw materials, scrap in particular. In no case are they able to operate at even near-capacity, and some fear that they will not be able to maintain present rates much longer.

Boston — With flanging departments about as crowded as plate mills, tank and boiler shops have difficulty in placing heads and maintaining balance between the two. Spun heads over 60 inches in diameter are scarce, with equipment taken up for months; smaller pressed heads are in first quarter with scattered exceptions. Builders of 3000-gallon and under tanks,

notably 2000-gallon units for underground gasoline storage, are short of plates, with demand high. Plate mills are not getting production expected due to raw material shortages and this is showing up in quality-extra grades, again reflecting selectivity in order acceptance earlier this year. Producers taking tank plates orders right along, mostly lighter gages in this grade, will have heavy carryovers extending backlogs into second quarter with substantial tonnages yet to be submitted to mills for scheduling. Only floor plates are relatively easy, November-December delivery with heavier gages in the latter month.

Seattle—Plates are in good demand, smaller plants being busy with boiler and tank fabrication involving small tonnages. Large projects are not sought, because of materials scarcities. Largest pending total involves 5000 tons for the Seattle Bow Lake 8-mile, 30 to 72-inch steel pipe line, on which Sound Construction & Engineering Co., Seattle, is low at $1,495,639. The sole bid for concrete pipe was $1.496.651.

Philadelphia—Plate production in this district declined during the past week, due to shortage of raw materials, particularly scrap. Two mills are operating at less than 50 per cent and in general producers are getting further behind on current commitments. New export allotments are now coming through, covering a period of four months beginning in November. It is estimated that 80,000 to 85,000 tons of plates are involved.

Birmingham— Except for occasional switching of ingots to piece out schedules pressing in other specifications, plate production holds at virtual capacity. Plate demand on the whole has eased little from the war period, although pressure for delivery is not nearly so great. Bookings, however, are solid through last quarter.

Tubular Goods . . .

Tubular Goods Prices, Page 179

Pittsburgh — Exceptionally heavy demand is expectetd to keep steel pipe inventories of jobbers below normal through the remainder of the year although production currently is at high level. Mill shipments on larger sizes are available late this year but in small diameters producers are booked into first quarter. The power piping division of Blaw-Knox Co. has been awarded a $400,000 piping contract for expansion of power plant facilities for the city of Los Angeles. The contract covers supply and installation of all piping, including high-pressure alloy steel piping in a new steam turbine electrical power unit. Shortage of pig iron continues to restrict production of cast iron pipe.

Boston — Several large steel pipe inquiries for 1947 delivery find no takers; on direct shipments mills are sold well through next year. Some buyers for utilities, slow in appraising the heavily sold position of producers, are not covered and have had inquiries returned. For two refineries and a gas distributing system, better than 30,000 tons to be bought by Boston district engineers is going the rounds unplaced. Some surplus stock is being bought, but not enough stock is available in sizes wanted. Demand on distributors is heavy and warehouse stocks are taxed; contractor-buyers frequently comb inventories of several before filling requirements. Jobbers tend to order fewer sizes in car lots, thereby improving deliveries in some cases, although this operates againt balanced inventory. Mechanical and pressure tubing is sold to midyear generally.

Seattle — Cast iron pipe demand has dr pped materially. While potential market is large it is apparent that buyers consider it useless to call for bids under present deliveries and are postponing improvements. Meanwhile, current shipments are afloat delayed by interruption of intercoastal steamship service.

Wire . . .

Wire Prices, Page 179

Pittsburgh — Absenteeism and down time has prevented an upturn in wire production normally occurring at this season. One large producer has scheduled no orders for the past two months, with the intention to clear up carryover tonnage this quarter. An incentive premium plan for nails, applicable on all tonnage produced in excess of established quotas, is expected to be announced soon. Under present prices producers are said to be restricting output of nails. However, current nail production is at about 65,000 tons monthly, well above output of June and July, and there is good prospect that 70,000 tons monthly will be reached by the end of the year. Reports continue that black marketing and hoarding of nails are holding back the housing program. Wire rope is the one product for which de-

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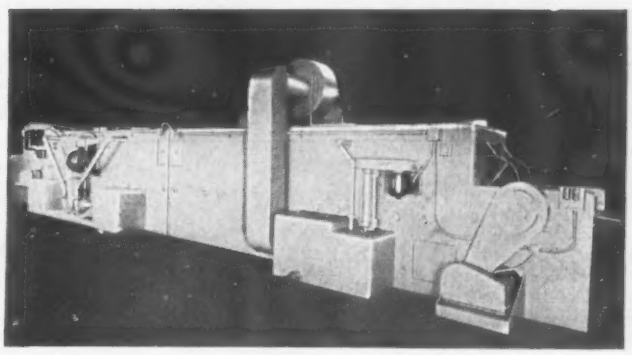

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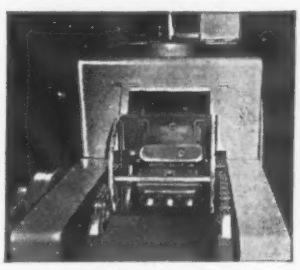

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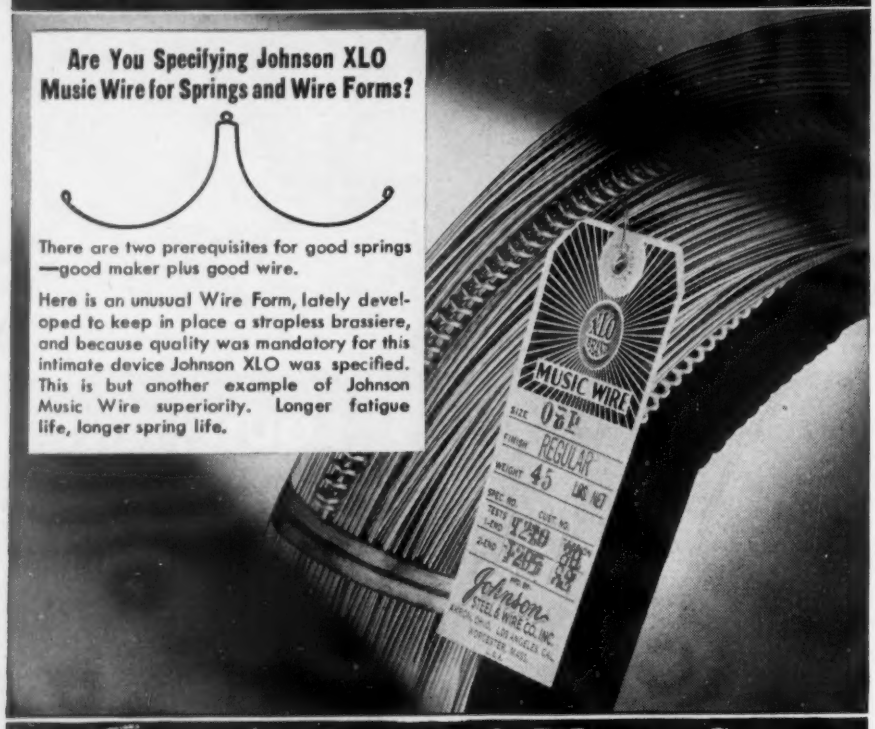

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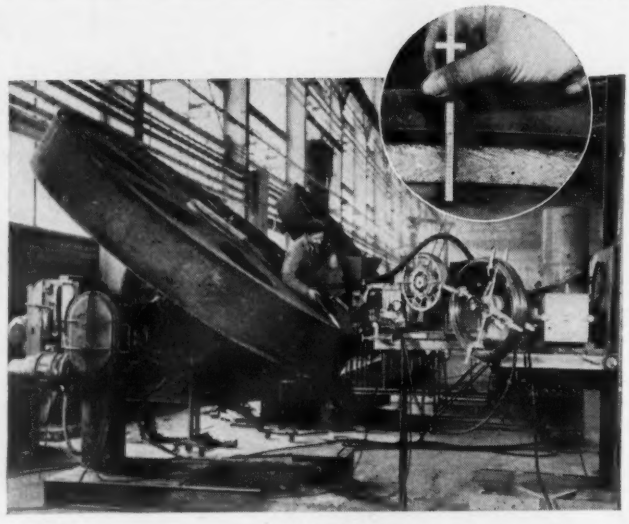

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mand is relatively light, with producers scheduled into first quarter on all other items.

Chicago — Demand for most wire items, manufacturers' as well as merchant, far exceeds production. Among products for which the shortage is most acute are medium and small standard nails, miscellaneous nails, brads and tacks, and wire fabric for use in storing the corn harvest. It is understood that one jobber in the Midwest is offering surplus landing mat for use as corn crib material. Heavy demand also is noted for building and concrete pipe mesh.

New York—Books are open for some products for next year by some mills but carryovers make definite delivery promises on most items uncertain. Wire consumers are not getting nearly the tonnage requested and production of new products is held back by lack of material frequently. The automobile industry is hampered by unbalance in components inventories, as are others, but inventories of valve spring wire and other grades are not building up to a point to bring about much easing in wire. Most mills are not getting estimated production, and integrated units, drawing all finished wire possible, are gradually tightening on rod supplies. The typewriter industry is representative of the unbalance in inventories which may affect demand for wire and other products soon. Here shortages of castings, and in the case of business machines, also taking fractional motors, is endangering production schedules.

Birmingham — Every item in wire remains exceedingly scarce. Even with advent of the fall season demand has not slackened perceptibly, especially for nails, which still remain at a premium and are virtually unobtainable, and for wire fencing. Drawn wire for processing is scarcely any better as far as supply is concerned.

Structural Shapes . . .

Many projects delayed by lack of CPA approval and inquiry shrinks; mills and fabricators loaded

Structural Shape Prices, Page 179

New York — While shape mills and fabricators still have substantial backlogs, nonhousing construction continues to decline as a result of CPA restrictions and the uncertain cost outlook, with labor costs particularly uncertain. Much public work not restricted by CPA would be going ahead if it were not for the fact that costs so often exceed appropriations. Another retarding factor is the unbalanced situation with respect to various other materials. The decline, however, is not so much in actual tonnage as in number of projects. Several important jobs are pending, including 5000 tons of subway construction near Jamaica, Long Island, on which the New York Board of Transportation opened bids Oct. 8.

Boston — Involving 9000 tons of steel, the 26-story superstructure for the John Hancock Insurance Co. building, at Boston will not go ahead on schedule, lacking CPA authorization; foundation will be completed and the piles capped. Contract for structural steel fabrication is

held by Bethlehem Steel Co. At least two large tonnage projects, branch plants for Lever Bros., Cambridge, Mass., in the midwest are affected, one temporarily abandoned at East St. Louis, Ill., and the other curtailed to a smaller section. Part of this steel is in American Bridge Co. backlog. Adverse factors, nonhousing restrictions, mounting costs, extended deliveries and shortages, are building up for the postponement of additional industrial construction. In this area active inquiry is the smallest in the postwar period. To date structural mills have experienced no easing in pressure, but a continuance or intensification of this slackening in primary construction might bring this about earlier next year than foreseen.

Philadelphia — Shape producers are are beginning to open books to the general trade for first quarter. However, new quotas will be fairly limited because of arrearages and protections already given on identified work. Meanwhile, new nonhousing demand is shrinking, with few orders being placed and few new inquiries active. Nevertheless, several projects on which bids have been submitted are up for final consideration, with at least two awaiting CPA approval. Bids recently went in on a state bridge in Montgomery county, Pennsylvania for the fifth time. On this occasion there were only two bidders, the same and only two who bid at the previous opening, and their bids were the same on both occasions.

Chicago — Structural fabricators display only mild interest in the few inquiries which arise. They have considerable work in progress, but suffer numerous hold-ups while waiting for mill shipments of various sizes of shapes. The smaller sizes are needed most, and mills report it is in this category that rolling schedules are most crowded. Looked for shortly is an inquiry for steel for the new die casting plant which Aluminum Co. of America is preparing to build in Hillside, Ill. Approval for construction has just been granted by CPA.

Seattle — Fabricating plants report no change in the situation. Inventories are almost exhausted and receipts are small. New business is available but is being refused because of uncertainty of completion. Tacoma, Wash., has called bids Oct. 21 for the 34th St. bridge, estimated at $430,310. Reclamation Bureau has awarded $128,362 contract to McKiernan-Tierney Corp., Harrison, N. J., for six hydraulic hoists for the Coulee pumping plant. Fairbanks, Morse & Co. and Peerless Pump Division Food Machinery Co. are low for pumps for the same project.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 179

Pittsburgh — A moderate increase in output of fabricated concrete bars is indicated following OPA's action, effective Oct. 9, increasing bending extras $3 a ton and engineering extras $2, and also permitting fabricators to charge published trucking rates when delivery is made entirely by truck. The revised extras now are $1.05 per 100 pounds for light bending and 55 cents for heavy bending. Designing extra, for any quantity, is now 40 cents. Some confusion may develop as result of fabricators being permitted to charge published truck-

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ing rates for not all such rates are identical. In the past fabricators charged 10 cents above carload freight rate for such shipments. This revision in freight rate charging procedure will be to the advantage of the fabricator, particularly on small shipments.

Critical shortage of reinforcing bars is retarding many building programs now under way, while a number of projects in blueprint stage have been shelved temporarily, due to extended mill dliveries. Most integrated steel producers continue to allot limited steel for reinforcing production. One interest has not booked any new business for some time as order backlogs are even now extended through most of first quarter on basis of present production schedules.

Chicago — Lacking steel and being overcommitted, reinforcing steel suppliers show little interest in new business, except for small fill-in lots of only a few tons each. Production lost by the steel and coal strikes is exerting a long-range effect. Competition has all but disappeared. Suppliers are under pressure from contractors they have supplied over the years, and in attempting to satisfy their requirements have little material left for other customers. Situation would be even more aggravated were it not for the fact that CPA is withholdnig approval on a considerable amount of commercial and industrial construction.

Cleveland — Producers' ceiling prices for fabricated concrete reinforcing bars were advanced, effective Oct. 9, about $2.50 per ton by increasing the permissible extras for bending and engineering. The increases are 15 cents per 100 pounds both light and heavy bending and 10 cents per 100 pounds for engineering. In addition, fabricators may charge published trucking rates when delivery is made entirely by truck. A study made by OPA revealed that fabricators had an average loss of $1.20 per ton on the sale of fabricated reinforcing bars during fourth quarter of 1945. Production costs have increased substantially since that period. At the mill level, producers are still swamped by orders for reinforcing bars, as well as other hot-rolled products, and are being pressed to book first quarter business.

Tin Plate . . .

Tin Plate Prices, Page 179

Cleveland—To insure enough tin plate for the food packing season in countries below the equator, Office of International Trade is issuing licenses now up to 55,000 short tons of tin plate for export in first quarter. By allowing them to be placed now, the government will enable mills to schedule production better, according to government officials. Fourth quarter allocations for export amount to 136,000 tons.

The Combined Tin Committee probably will make an upward revision in its tin allocations for second half of 1946, now amounting to 18,055 tons compared with about 25,000 tons for the first six months. Bulk of the allocations in tons for second half are: United States, 6400; France, 4000; India, 2000; Canada, 1200; Italy, 800; Switzerland, 640; and Czechoslovakia, 600. Tin will come from Belgian, British or Dutch sources, plus some from South Africa and also from Japanese stocks held in the United States.

Chicago — Although box car shortage is a day to day threat, tin plate is moving to customers as rapidly as produced. In spite of this, consumers press for material. If the next 30 to 60 days can be passed without shipments suffering from short car supply, worst of the interference from this source should be over.

Pig Iron . . .

October preference allotments continue heavy at expense of producers of nonrated castings

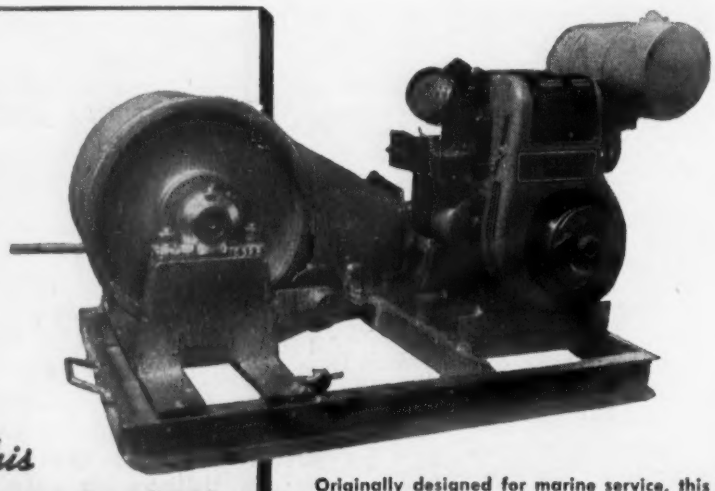
Pig Iron Prices, Page 181

Pittsburgh—Although some foundries resumed operations on a restricted basis last week, foundry pig iron consumption remained less than 50 per cent of normal because of the electric power strike. Foundries forced down due to lack of power include: Columbia Radiator Co., Fort Pitt Malleable Iron Co., and American Radiator & Standard Sanitary Corp. Temporary curtailment in operations has made it possible for many foundries to accumulate moderate inventories of scrap, coke and pig iron. However, these materials remain in critical short supply and no significant improvement is indicated until late this year at earliest. Leading interests, granted preferred pig iron deliveries under the veterans housing program, state certified tonnage for October remains substantially unchanged from September. Steel castings were exempted from price control Oct. 4, reflecting ample supply, in sharp contrast with gray iron and malleable castings. Blast furnace producers that normally supply the New England district may soon be granted higher prices on such shipments to offset freight charges that have been blocking flow of iron into that area. Under this proposed plan producers would be permitted open billing until freight costs are known.

New York — Preference allotments for October correspond closely with those of last month, pig iron sellers declare. The melt among district foundries is increasing somewhat, however, as there are fewer handicaps resulting from labor disturbances. The Brooklyn foundries which suffered particularly from strikes in the trucking industry last month, are apparently getting iron at this time in fairly good amount. Nevertheless, there are drawbacks resulting from rail congestion which has again developed because of further strikes along the water front and also because of continued disturbances among truckers, although less pronounced than recently. In general the expectation is that pig iron consumption in this district will be heavier in October than in September. One of the bottlenecks is continued shortage of coke, with some foundries more concerned about that than their ability to get pig iron.

Philadelphia — Pig iron sellers report that their allotments of preference tonnage this month have been increased substantially for this district. This will be at the expense of foundries engaged in nonrated work and also at the expense of basic consumers. This, combined with lack of scrap and increasing shortage of coke, is placing these interests in a tight situation.

Cleveland — Shortages of coke and scrap continue to restrict production of castings, although the melt for this month



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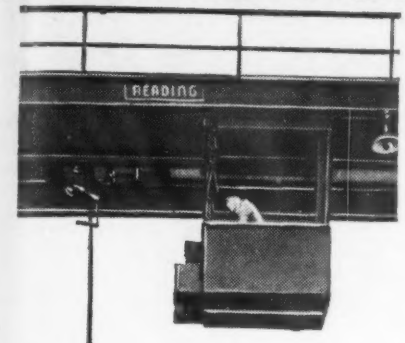

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is expected to be a little higher than in September. Supply of coke remains tight due to the difficulty in obtaining adequate tonnages of coking coal, forcing oven operators to reduce quotas of some foundries. Scrap is even more difficult to find. Shipments of pig iron have increased and will be sharply higher during October in some instances. This is attributed in part to the fact that some furnaces have been able to switch from basic to foundry grades. Some foundries here have sufficient orders to carry through 1947.

Cincinnati—The foundry melt in this district continues near September levels, governed by supplies of pig iron and scrap. There is only slight change in rated tonnage, and others are dependent on steady shipments, in absence of inventory, to maintain operations.

Buffalo — Tension became more severe in the pig iron market during the week as producers were hard pressed for additional metal for ingot operations and foundry use. The tight supply situation was declared unprecedented and far worse than during the war. The leading merchant iron producer inaugurated a month-to-month order basis instead of a quarterly booking period. Tightening the local market was the move to go ahead with plans to revive shipping schedules to outlying areas, especially the New England and seaboard sections. Producers had been taking advantage of confining shipments to nearby consumers.

One local producer reported iron being assigned to an ingot maker in another area. A check reveals most foundries are operating on a hand-to-mouth basis with limited iron supplies checking operations. Coke and ore shortages are also noted. Meanwhile, another boatload of 5000 tons of iron, making a total of approximately 15,000 tons in two weeks, has arrived from the upper lakes. Improvement has been noted in the freight car situation.

Boston—Pig iron consumers will enter the winter with low inventories despite more concrete moves to relieve the New England shortages; these include renewal of production at Everett, Mass., scheduling of foundry grades at Troy, N. Y. and incentives offsetting freight absorptions, notably by Buffalo shippers. These objectives will help eventually, but substantially more iron this quarter to unrated melters is conjectural. Mystic tonnage will be thinly distributed through December and more ore must be found if capacity is reached and maintained. Rated tonnage will affect supply from New York furnaces and most of the larger melters do not qualify. Rated volume in New England is somewhat under the national average, totaling approximately 225,000 tons this month against 185,000 tons in September. The increase, despite non-allocation of iron for farm machinery this quarter, is due to heavier priority for housing products, more than 195,000 tons.

Chicago—Until some increase in pig iron production is effected, foundries see no opportunity to increase melting operations. Iron receipts are closely controlled by allocation and since inventories are virtually absent, schedules are maintained on a week to week basis. Shortage of cast scrap requires heavier use of iron, the improved availability of scrap following the recent price boost now having faded out. For immediate future, foundries see little possibility for

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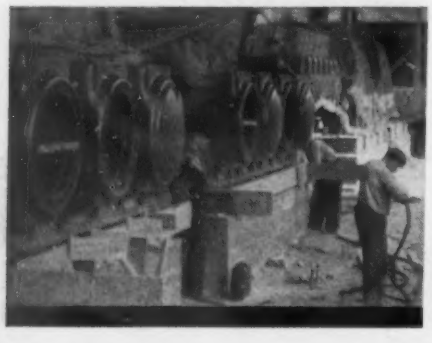

making any sizable dent in their heavy order backlogs.

Birmingham—Pig iron production is maintaining the most consistently high schedule of months but makes little inroad into demand. Pipe plants are still curtailed to a five day week as a regular schedule and to occasional three and four day weeks. Foundries are not getting by 50 to 75 per cent their iron requirements.

Scrap . . .

Steel production maintained at expense of inventories as supply shows no sign of improvement

Scrap Prices, Page 182

Pittsburgh—Further reduction in consumer scrap inventories is noted, with incoming shipments showing no significant improvement in recent weeks. Steel mills here have been able to maintain capacity operations at expense of rapidly dwindling scrap inventories, but the outlook is not encouraging for winter. It is hoped intensified efforts to get additional farm and shipbreaking scrap will ease the situation. Most of the limited tonnage currently moving to consumers' yards is shipped directly by producers as dealers are not making much effort to collect scrap at present price spread for unprepared material. Upgrading continues on a fairly large scale with No. 2 steel sold as low phos. The inventory control plan for users and suppliers, to equalize scrap distribution is still under consideration. It is pointed out that consumer stocks are well below the proposed restriction of 30 days supply for cast scrap and 45 days for other grades.

New York—Scarcity in scrap continues pronounced. District consumers assert that following a slight pick-up after OPA's latest announcement with regard to price policy last month, the movement has again declined, with current receipts less than half what they actually require. All are greatly concerned over their inability to lay aside any stocks for winter and it is their idea that the situation will become worse before it gets better. Moderate price increases in cast scrap helped for a time, but there is a fundamental shortage of cast which even present higher prices cannot materially relieve. In steel scrap there is a fair amount of material but collectors show little interest at existing price levels which have been unchanged since spring of 1941. Upgrading is still reported on a rather broad scale.

St. Louis—The scrap industry remains in the doldrums, with only an occasional car of railroad metal moving. Shipments are under 10 percent of normal. This district, however, is not yet critically short, due to ground stocks accumulated during a 21-week strike shutdown at one mill. Mill reserves average around 30 days and foundries are in fair condition except for cast. Some brokers report dealers at collection points have quit buying scrap and are concentrating on paper and other side lines. These dealers say they can get above ceiling prices locally and therefore refuse to ship.

Cincinnati—Melters of iron and steel scrap are pressing for heavier shipments in hope of bolstering inventories, now so low that few would be affected by proposed stock controls. By judicious spreading of available tonnage, acute distress is being avoided. A slight improvement in production scrap may be developing, but the extent is hard to judge because of trading arrangements. Scarcity in cast scrap continues acute.

Detroit—Some brokers profess to see some easing in the scrap market but at best it is only slight. Possibility of General Motors Corp. production scrap returning to normal trade channels after going on an exchange basis for pig iron may be one reason. Manufacturing cutbacks, like the 40 per cent reduction by Chrysler, will cut into flow of production scrap. Some observers look for an industry-wide suspension of operations about Dec.1, incident to model changeover and a realignment of personnel in an effort to establish profitable operations for 1947. Suspension of Ford open-hearth production as a result of a strike by cranemen may permit some build-up of scrap stocks.

Cleveland—Scrap supplies of consumers continue to decline under high steel production and receipts are less than consumption. Some slight improvement has been noted in cast grades, but these, too, are short of needs. Operators of open hearths continue to take in low phos scrap under government permission but this is not sufficient to make up for shortage of regular grades. Instances of upgrading are noted. Yards are processing only relatively small tonnages and most current supply is from fabricators.

Philadelphia — Scrap shipments show no gain, with volume falling far short of requirements. Some large consumers of heavy melting steel report receipts short by 50 per cent of what is needed to operate at capacity, to say nothing of building up a winter reserves. Operations in general are tapering as a result, with sharper declines predicted. Some consumers, including large melters, refuse to accept ungraded material and as a result see much material going past their plants, some to other districts.

Buffalo — Only one of the three leading mill consumers in the area is reported holding its own on scrap receipts. As a result, talk of CPA controlled inventories is not expected to have appreciable effect here. According to reports all open-hearth consumers have received government permission to acquire low phos scrap. Considerable upgrading is reported as mills plead for scrap. Little attention is said to be given to the $2.50 difference in the ceilings on heavy melting scrap and low phos. Vanishing reserve stocks of one mill were hit harder than expected as a basic blast furnace was forced down temporarily.

Boston—Scrap shortages are intensified by the high ratio in melts due to lack of pig iron; this off-pattern melting will continue well through this quarter or until iron supply improves; it is reflected in more rejected heats and quality of castings. Quality of scrap is frequently off and tonnage is accepted which would normally be rejected; cast consumers depend on spotty and uncertain deliveries. Movement of steel scrap lags with consumer inventories falling at a period supplies would normally be building up; shipments of yard material are meager. Over-ceiling prices were bid on several thousand tons of unprepared melting steel in New England recently and the question of awarding contracts has been referred to Washington; 2840 tons of tank plates, Davis-

ville, R. I. brought out a high of $33.65, gross ton, by James J. Heggie Iron & Steel Co., Boston. This and part of the 1700 tons, ship scrap, Boston navy, could be salvaged.

Chicago — Only hand-to-mouth receipts of scrap enable consumers to maintain operations. Steel mills are holding ingot production at 91 per cent of capacity, but not without struggle and aggressive search for melting material. Production scrap is not coming out in the volume that might be expected to conform to high level shipments of finished steel, indicating that unbalanced inventories are acting as a brake on manufacturing schedules. Unable to accumulate workable inventories, steelmakers fear for their ingot rate next winter when receipts are slowed. The scrap trade lacks enthusiasm for the proposed scrap inventory control and doubts that it will result in improved supply. Cast scrap continues as tight as before the recent price boost, and reports of black market buying are more numerous.

Birmingham — The scrap pinch continues to be felt, especially by the second largest local consumer, which is picking up what it can and using pig iron in increasing quantities. Brokers report virtually nothing being offered at ceiling prices and little scrap being processed on yards. Some accumulation of unwanted items is evident.

Seattle — Scrap supply is becoming more critical. Mills have sufficient supply in sight to insure operation to the end of the year but after that may have to close unless the situation is relieved. Shipments are only a fraction of consumption and inventories are being depleted rapidly. Many shippers are sitting tight and refuse to sell at present prices. Margin between unprepared and prepared material is not sufficient to interest yards and they will not process at present levels.

Warehouse . . .

Warehouse Prices, Page 180

Cincinnati—Mill shipments to warehouses so far this month have shown no abrupt drop although some interests foresee a lighter tonnage in fourth quarter, due to expiration of directives. Demand is unabated, and far above supply in sheets, small bars, structural steel and plates.

Chicago — While flow of steel from mills to warehouses is heavy, it is inadequate to meeting demand. Stocks are low and unbalanced, and material moves to customers about as railroad cars arrive, short-circuiting the normal unloading and transfer to stocks. Manufacturers of metal products, unable to obtain sufficient steel direct from mills, seek to acquire whatever additional material they can from warehouses. Consumers appear to be somewhat more selective in their purchases than formerly, this being explained by the fact that they currently want certain items badly to balance inventories.

Nonferrous Metals . . .

Nonferrous Prices, Page 183

New York — Shortage of lead, continuess to force many consumers to operate at very low production levels. Although allocations in the third quarter

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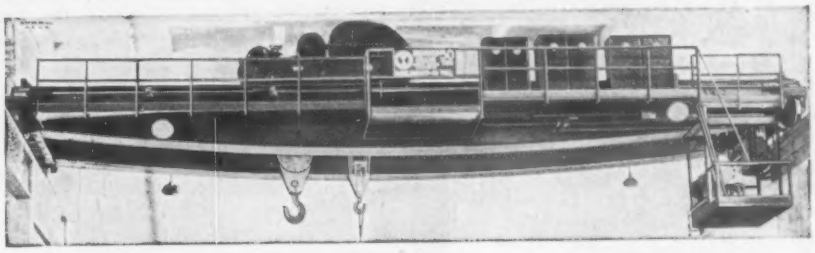

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amounted to 232,500 tons, consumers were able to obtain only about 182,000 tons in that period. Total permitted lead allocations in the fourth quarter have been cut 20,000 tons to 212,500 tons in an attempt to limit the "tickets" to the available supply. Lead use was actually greater than the 182,000 tons in the last quarter but this consumption was attained only by a reduction in consumers' inventories to very low levels. New automobiles and other new equipment will receive preference for lead allocated for the production of electric storage batteries in the fourth quarter. This was made possible through a 20 per cent cut in allowable lead uses for automotive replacement batteries, plus expectations of a moderate increase in domestic lead output and higher imports during the balance of this year.

Stocks of zinc dropped about 5000 tons last month to 232,588 tons as shipments rose to 63,682 tons while production held fairly steady at 58,657 tons. Withdrawals from government stocks have dropped to only 474 tons, compared with a high of 15,210 tons in March while export and drawback tonnages accounted for 5323 tons, compared with 7678 tons in August.

Canada . . .

Toronto, Ont. — While the steel strike is settled and men are returning to work at the plants of Algoma Steel Corp., Sault Ste. Marie, and the Steel Co. of Canada Ltd., Hamilton, there is still a hitch as far as Dominion Steel & Coal Co., Sydney, N. S., is concerned. Dominion Steel & Coal Co. apparently has not agreed to the increase in wages and officials point out that they cannot afford the additional payments. On the other hand, it is understood that some arrangement is pending whereby the federal government will subsidize the company, although nothing definite has been reached as to how long the government will continue its subsidy, which amounted to several millions of dollars annually through the war years.

The Steel Co. of Canada Ltd., the only one of the three big basic steel producers to fight the unions and maintain production, is reported to have upwards of 100,000 tons of steel available for shipment and some deliveries now are being made. However, no information is available as to what this tonnage actually consists of, although bars and rods are said to be included. No sheets or strip were produced by the company during the strike period and it will be a week or ten days before production is resumed and in the meantime present bookings are said to be sufficient to absorb all production to the end of March, and probably have a carryover into second quarter. It also will be a couple of weeks before the plate mill again is in regular production. Algoma Steel Corp. is not expected to be in a position to resume production and steel deliveries for a month or six weeks. At the moment there is no indication that Dominion Steel & Coal Co., Sydney, is getting ready for production and it is not expected to be much of a factor in providing steel during the remainder of the year.

With the settlement of the strike considerable interest developd from consuming interests regarding the placing of new and large tonnage forward delivery contracts. However, producers are not interested in new business at this time, pointing out that on all the heavier materials bookings are solid to the end of the year and on some materials to the end of first quarter. On some of the lighter steel lines new orders are being taken. Wire and nails are in critically short supply and with the exception of the Steel Co. of Canada it is not expected that there will be any large production of nails in Canada until Dominion Steel & Coal Co. resumes operations.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

4400 tons, factory, Cleveland, for Perfection Stove Co., to American Bridge Co., Pittsburgh.

1580 tons, warehouse building, Chicago, for unstated owner, to American Bridge Co., Pittsburgh; H. K. Ferguson Co., Cleveland, contractor.

155 tons, power plant, Bridgeport Brass Co., Bridgeport, Conn., to Haarmann Steel Co., Holyoke, Mass.; Stone & Webster Engineering Corp., Boston, contractor-engineer.

STRUCTURAL STEEL PENDING

1500 tons, gantry trestles, Davis dam, Kingman, Ariz., for U. S. Bureau of Reclamation.

835 tons, steel girder viaduct over New Haven railroad and Connelly avenue, Hamden, Conn.; Mariani Construction Co., New Haven, low $394,474.18, Sept. 30, state project.

275 tons, duPont plant at San Francisco.

200 tons, state bridge in Cambria county, Pennsylvania.

REINFORCING BARS . . .

REINFORCING BARS PENDING

750 tons, Southwest Side intercepting sewer, Contract No. 12, for Sanitary District of Chicago; bids Oct. 24.

175 tons, for bridges, route S3, section 4B, Clifton, N. J.; bids Oct. 22, Spencer Miller Jr., state highway commissioner, Trenton.

150 tons, elevators, soy bean plant, Kankakee, Ill., for Borden Co., Crosby Co., Chicago, contractor.

115 tons, alterations, Ottawa, Ill., for Bakelite Corp.; F. J. McGraw Co., New York, contractor.

Unstated, 34th St. bridge, Tacoma, Wash.; estimated at $430,310; bids Oct. 21.

Unstated, first unit Oregonian plant, Portland, Oreg.; contract to L. H. Hoffman, Portland.

PLATES . . .

PLATES PENDING

5000 tons, 30 to 72-inch water pipe, Bow Lake project, Seattle; Sound Construction & Engineering Co., Seattle, low at $1,496,651.

1910 tons, ½-inch stainless steel plates, for Aswan dam, Egypt.

135 tons, 2000 street light standards, Chicago, for Department of Streets and Electricity; bids Oct. 10.

RAILS, CARS . . .

RAILS PLACED

Pennsylvania Railroad, 200,000 tons placed, distribution not announced.

Seaboard Air Line, 25,000 tons of rails to Bethlehem Steel Co., Bethlehem, Pa., and 21,000 tons of Tennessee Coal, Iron & Railroad Co., Birmingham.

LOCOMOTIVES PENDING

New York, New Haven & Hartford, 15 three-unit 4500-horsepower diesel-electric.

RAILROAD CARS PLACED

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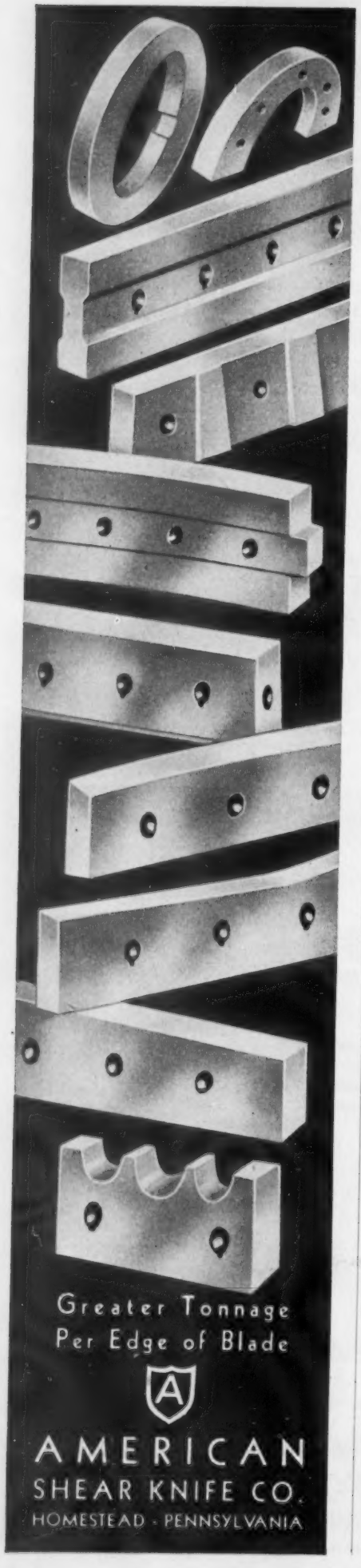

Steel Producers Increase Light Products Output

(*Concluded from Page 77*)

and output is maintained over the remainder of the year at the pace set during the summer months.

In the first eight months of the year ingot output totaled 40,834,287 net tons, which compares with 55,863,970 produced in the like period of 1945. However, August output of 6,895,465 net tons set a postwar monthly record, and should this pace be continued over the remaining four months of the year 1946 production will exceed 68 million tons, a record for peacetime if 1941 is excluded.

Volume production of steel, however is falling short of meeting expanded consumer demands with the result critical shortages are holding manufacturing operations down. It is pointed out, however, that manufacturing curtailments are not due solely to steel shortages, since scarcity of other raw materials such as copper and lead and components are equally a factor.

In the case of steel, requirements are being handled as far as possible on the basis of customers' normal prewar demands. This means that some consumer goods industries are receiving more steel this year than was the case during the war years. For instance the automotive industry, which was virtually nonexistent as a producer of automobiles during the war, in the first six months of 1946 is understood to have received 11.6 per cent of the total steel produced. This compares with 4 per cent in all of 1945 and 10 per cent in 1941.

Distribution schedules in the steel industry are being interfered with by the imposition of priority-rated orders in rolling schedules. Further, production of certain high-cost items is not as large as market demands of the moment. All of which is reflected in shortages at consumer plants.

CONSTRUCTION AND ENTERPRISE

ALABAMA

MOBILE, ALA.—Tennessee Valley Authority, Knoxville, Tenn., plans construction here of a phosphate fertilizer plant to cost about $3 million.

CALIFORNIA

LOS ANGELES—Industrial Mfg. Co., 7152 Sepulveda Bldg., has permit for erection of machine shop at 5933 Lemona Ave., 50 x 80 feet, to cost $12,000.

LOS ANGELES—California Cornice Steel & Supply Corp., 1600 North Spring St., has permit for a crane runway to cost about $9000.

LOS ANGELES—L. E. Tabjohn, 2811 San Fernando Rd., has building permit for a machine shop 80 x 80 feet at 2409 San Fernando Rd., to cost about $16,000.

SANTA ANA, CALIF.—Towner Mfg. Co. has let contracts to Consolidated Steel Corp., 5700 South Eastern Ave., Los Angeles, for design and construction of a plant for manufacture of farm implements and a warehouse for assembly purposes, at 2111 West Seventeenth St., to cost an estimated $54,180.

FLORIDA

MIAMI, FLA.—Florida Power & Light Co., Ingraham Bldg., plans generator plant addition at cost of $530,000. Ebasco Services Co., 2 Rector St., New York, is engineer. (Noted Oct. 7).

GEORGIA

COLUMBUS, GA. — Columbus Iron Works, Front Ave., has let contract to Pound Murphy Construction Co., Hill Bldg., for a manufacturing plant to cost about $90,000.

INDIANA

ELKHART, IND.—Speedgrip Chuck Inc., 137 South Riverside Ave., has been incorporated with $30,000 capital and 500 shares common stock, to manufacture lathe chucks, by F. I. Ernest and associates.

GREENFIELD, IND.—Elliott Mfg. Corp., Tague and Pennsylvania Sts., has been incorporated with 200 shares no par value to manufacture metal wagon bodies and similar products, by Benjamin A. Elliott and associates.

INDIANAPOLIS—W. C. Grant Co. Inc., Indianapolis, manufacturer of ovens, dip tanks, conveyors and special machinery will erect an additional plant building to expand manufacturing facilities.

LA PORTE, IND.—Maple City Supply Co. Inc., 105 Park Ave., has been incorporated with 1000 shares no par value to deal in iron, steel and metals, by Nathan Winski and associates.

MISSISSIPPI

LAUREL, MISS.—Jones County Co-Operative, Charles McNeil, manager, plans a superphosphate plant costing $150,000 and fertilizer plant costing $100,000.

NEW JERSEY

CAMDEN, N. J.—DiMedio Lime Co., 26 North Eighteenth St., has let contract for a one-story plant to Thomas Pagan, 933 North 30th St., to cost about $60,000.

NEW BRUNSWICK, N. J.—Zonite Products Corp., 370 Lexington Ave., New York, has let contract to Walter Kidde Constructors Inc., 140 Cedar St., New York, for a plant addition costing about $300,000.

PAULSBORO, N. J.—Socony-Vacuum Oil Co., Paulsboro, has let contract to Turner Construction Co., 1500 Walnut St., Philadelphia, for a two-story chemical research laboratory, estimated to cost $800,000.

OHIO

AKRON—City Machine Co., 868 East Tallmadge Ave., J. Brown in charge, will build an addition and make alterations costing $20,000 to its plant at 1069 Home Ave., to enlarge manufacturing space.

CANTON, O.—Safety Signals Inc. has been incorporated with 1000 shares no par value, by Frank S. Hertzig, 2707 West Tuscarawas St., and associates.

CLEVELAND—Ohio Mold-Machines Co. has been incorporated to manufacture molding machines, by Adrian Medert, 555 Terminal Tower, attorney.

CLEVELAND—E. W. Tool & Mfg. Co. has been formed by Edward Wenzel, 3600 Wade Ave., and E. Eberhardt and is building a machine shop at West 68th St. and Denison Ave.

CLEVELAND — Hydro-Air Cleaning Systems Inc., 7400 Stanton Ave., H. E. Wiedlund, president, has changed to a corporation and

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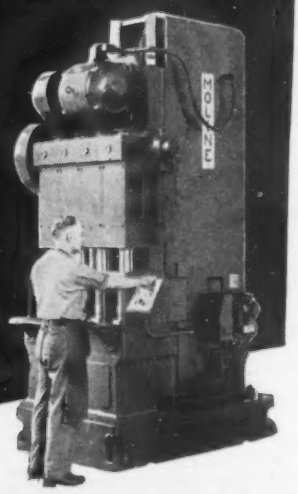

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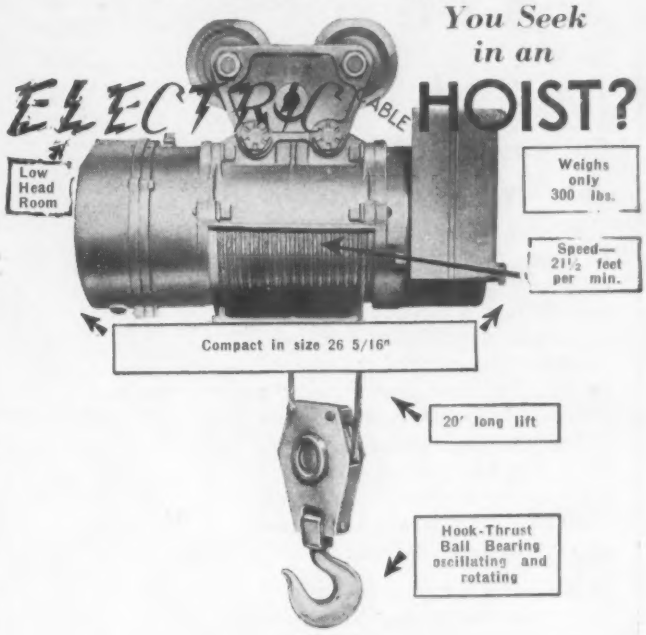
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CLEVELAND—Evans Mfg. Co., 1239 East Ninth St., Sidney J. Evans, president, will build a one-story plant at 13000 Triskett Rd., 30 x 100 feet.

CLEVELAND—G. A. Henrickson Co., G. A. Henrickson, owner, Cuyahoga river and Jefferson bridge, ship construction, will build a one-story 50 x 66-foot shop building costing $12,000, to expand facilities.

CLEVELAND—Armstrong Co. has been incorporated by J. L. Moes, 4500 Euclid Ave., and associates, to manufacture automotive and airplane parts.

CLEVELAND—Peerless Packing Co., 3290 West 65th St., M. T. Davis, president, plans plant addition to extend fertilizer manufacturing facilities and a boiler plant. New equipment will be installed.

CLEVELAND—Modern Tool & Die Co., 5398 Settlement Rd., plans a plant addition to increase production, at cost of about $45,000.

CLEVELAND—Thompson Products Co., 23555 Euclid Ave., will build an addition to house million-volt X-ray equipment, at cost of about $80,000.

CLEVELAND—Globe Stamping Division of Hupp Motor Car Co., 1250 West 76th St., has plans for an expansion costing about $1 million. R. E. Wilcox is treasurer.

HUDSON, O.—Hudson Sheet Metal Co. has been incorporated to manufacture sheet metal products, by J. R. MacGregor, Second National Bank Bldg., Akron.

MANSFIELD, O.—Marion F. Hawkins, 68 North Mulberry St., is building a machine shop for manufacture of automobile parts, at cost of about $40,000, to which operations of present plant will be removed.

NEW PHILADELPHIA, O.—Meyer Blazer Mfg. Co., recently incorporated, by David Meyer, 832 South Tuscarawas Ave., with $50 000 capital, will manufacture fuel units for production of heat and power.

POLAND, O.—Weather-Vane Co. has been incorporated with 300 shares no par value to manufacture machine tools, by W. W. McClain, 70 East Evergreen St., and James Phillips, 523 Yale Ave., both of Youngstown.

WARREN, O.—Niles Machine & Welding Co., North Main St., plans an assembly and welding unit near Warren airport, covering 11,000 square feet, for manufacture of portable hydraulic cranes and steam shovel booms.

WARREN, O.—Thomas Steel Co., Delaware Ave., will build a boiler plant to cost about $37,700, to increase production facilities.

YOUNGSTOWN—Great Lakes Carbon Co., 333 North Michigan Ave., Chicago, has let contract to Joseph Bucheit & Sons Co., Youngstown, for a plant for manufacture of rock wool, estimated to cost about $200,000.

SOUTH DAKOTA

MOBRIDGE, S. DAK.—Montana-Dakota Utilities Co., Mobridge, has let contract to S. W. Johnson & Co., Citizens Bldg., Aberdeen, S. Dak., for power plant improvements, including two diesel units, to cost about $60,000. C. M. Garland & Co., 38 South Dearborn St., Chicago, are engineers.

TENNESSEE

MORRISTOWN, TENN. — American Enka Corp., Enka, N. C., has CPA permission for erection of a viscose rayon plant at Lowland, near here, according to announcement by L. A. Moritz, assistant to vice president. H. K. Ferguson Co., Hanna Bldg., Cleveland, is consulting engineer and contractor. First unit is planned for 22 million pounds of rayon annually.

TEXAS

ALVIN, TEX.—Phillips Petroleum Co., Neils Esperson Bldg., Houston, Tex., plans gas distillate plant, estimated to cost about $2 million.

GALVESTON, TEX.— Army engineers here have let contract for designing veterans' hospitals at Dallas and Houston, Tex., to Wyatt C. Hedrick and Kenneth Franzheim, both of Houston, Tex.

HOUSTON, TEX.—Crane Co., 2205 McKinney Ave., is having plans drawn by Lamar Q. Cato, 2103 Crawford St., for a manufacturing plant and warehouse, to cost about $225,000.

HOUSTON, TEX.—Independent Oxygen Co., 2707 Fenwood St., plans an oxygen and acetylene plant, to cost about $100,000.

WASHINGTON

ABERDEEN, WASH.—Grays Harbor Dairy Products Inc. plans a plant 130 x 150 feet, including conveyor system, washing and pasteurizing equipment. Plans are by Pyramid Co., Seattle.

BREMERTON, WASH.—City's 1947 budget includes $544,800 for sewage treatment plants, for which state aid is expected.

HOQUIAM, WASH.—Port of Grays Harbor Creamery Co., will open bids Oct. 7 for a $200,000 dairy plant 102 x 138 feet, on plans by Pyramid Co., Seattle.

SEATTLE—Elliott Bay Mill Co. plans construction of a large sawmill plant at 3625 Duwamish Ave., 100 x 400 feet, with steel canopies over 12-foot loading platforms.

SOAP LAKE, WASH.—Morrison-Knudsen Co., Seattle, is low bidder at $235,583 and has been awarded contract for municipal sewage treatment plant and storage reservoir.

SPOKANE—CPA district office has approved cold storage warehouse at Wenatchee, Wash., to cost $60,000; concrete grain elevator for Colfax Grain Growers Inc., costing $90,000; concrete grain elevator for Lacrosse Grain Growers Inc., $150,000.

TACOMA, WASH.—Port of Tacoma has awarded contract to American Sheet Metal Co., Portland, Oreg., at $44,850, for installation of a dust control system.

YELM, WASH. — Enumcla Co-Operative will open bids Oct. 8 for a dry-valve sprinkler system for the port warehouse.

WEST VIRGINIA

BRIDGEPORT, W. VA.—Manufacturers Light & Heat Co., South Lincoln Ave., has leased 1½-acre site from Wheeling Steel Corp. for a peak load propane plant with capacity of five million feet daily.

FOLLANSBEE, W. VA.—Wheeling Steel Corp., Wheeling, W. Va., has let contract to Koppers Co., Koppers Bldg., Pittsburgh, for two 55-oven coke batteries and for a brick stack to Rust Engineering Co., Rust Bldg., Pittsburgh. Cost is estimated at $5 million.

CANADA

PORT UNION, ONT. — Canadian Johns-Manville Co. Ltd., 199 Bay St., Toronto, Ont., has awarded general contract to Foundation Co. of Canada Ltd., 1220 Bay St., Toronto, for construction of plant near here to cost approximately $100,000.

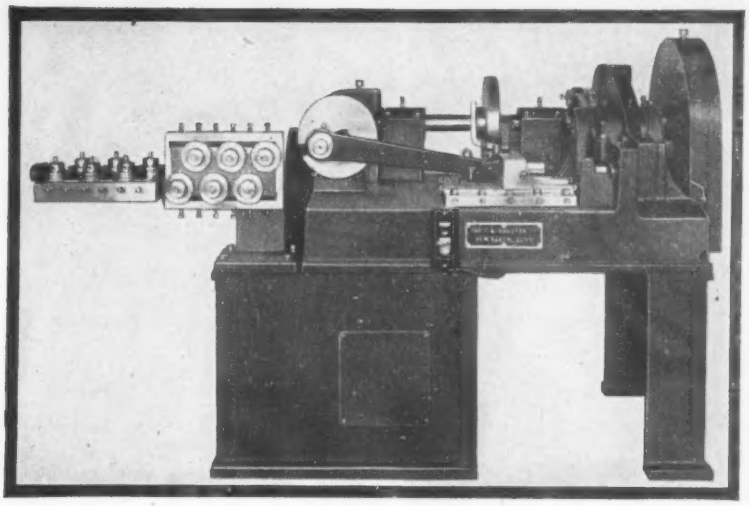
TORONTO, ONT.—Canadian Jewellery Case Co. Ltd., 6 Church St., has awarded general contract to Walter Davidson & Co., 188 Duke St., for erection of plant addition to cost about $30,000.

WATERLOO, ONT.—Reliable Truck & Body Co., King St., north, is having plans prepared by Jenkins & Wright, architects, 47 King St., East, Kitchener, Ont., for erection of plant addition estimated to cost $35,000.

MONTREAL, QUE.—Standard Desk Mfg. Co. Ltd., 4157 St. Dominique St., is having plans prepared for erection of factory here to cost about $50,000.

MONTREAL, QUE.—Turner & Newall (Canada) Ltd., head office, Trafford Park, Manchester, England, has awarded general contract to Anglin-Norcross Corp. Ltd., 892 Sherbrooke St., W., Montreal, for construction of a plant here estimated to cost about $4 million. Structural steel contract awarded to Dominion Bridge Co. Ltd., Lachine, Que.

VILLE LaSALLE, QUE.—Montreal Coke & Mfg. Co., 435 St. Patrick St., has awarded contract to Products Coke Ltd., Pittsburgh, Pa., for erection of plant addition to cost $600,000.



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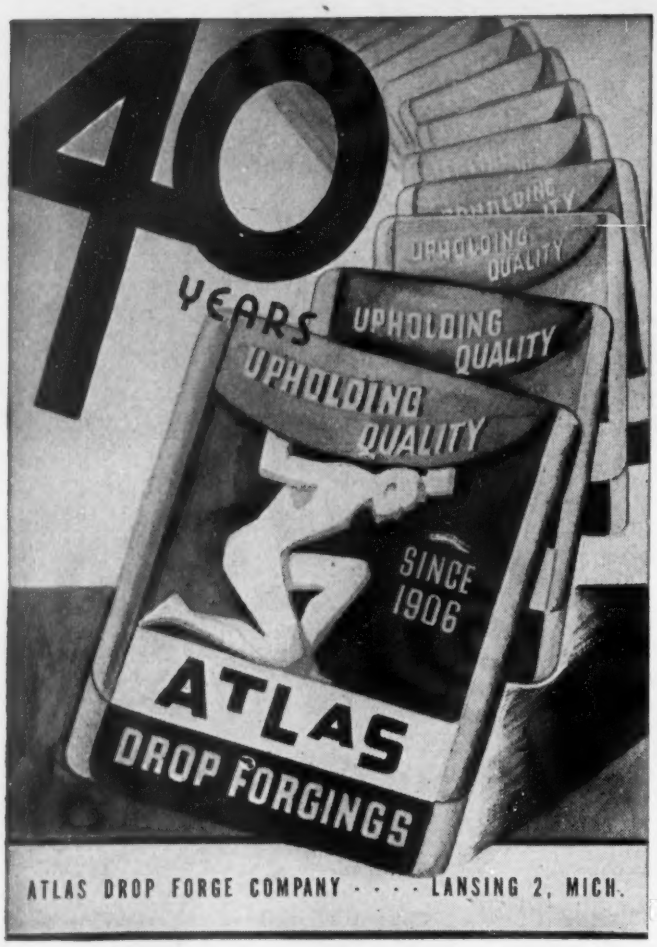

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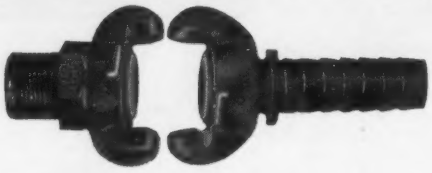

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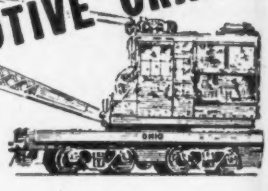

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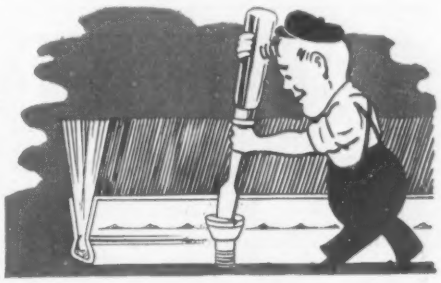

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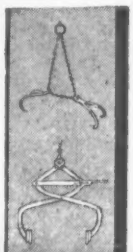

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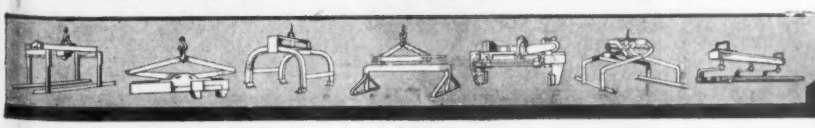

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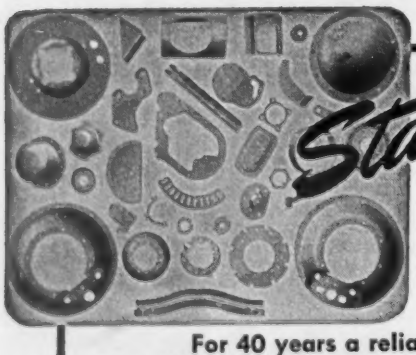

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Space Limited...used SPEEDAIRE

TO operate this Coal Conveyor at a New Jersey aluminum plant, Speedaire was installed for these four excellent reasons:

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Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers

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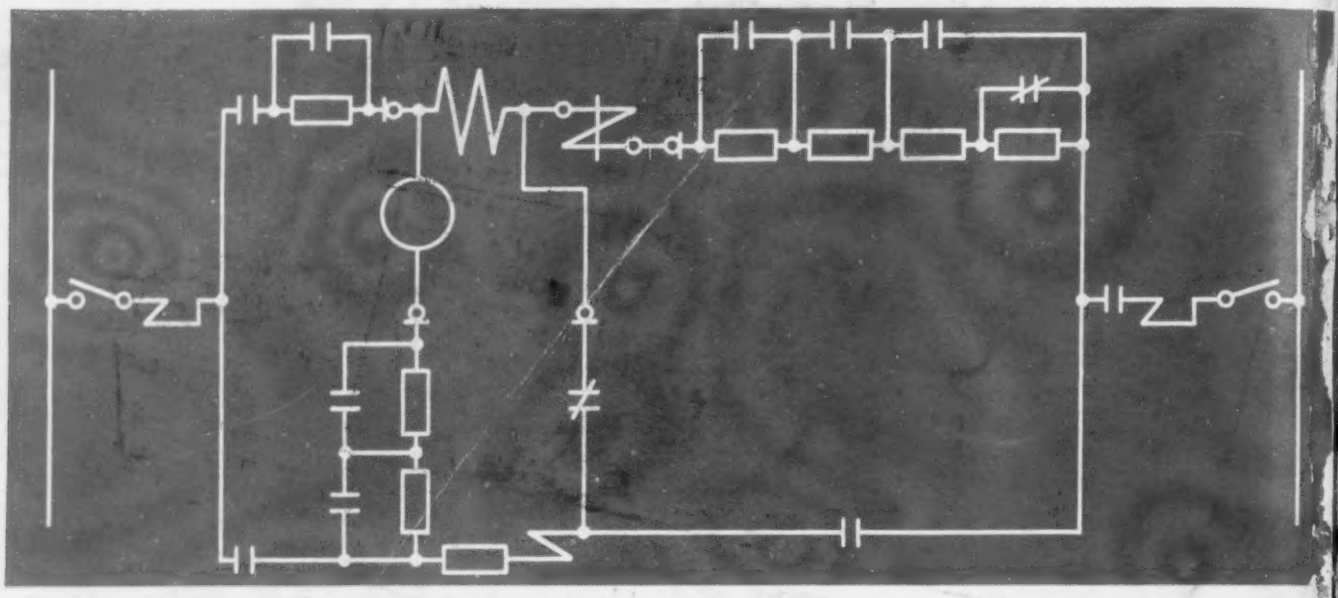

When you have an installation such as a crane hoist or winch where the load may be overhauling and requirements dictate a series motor with dynamic braking . . .

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LTI ACCELERATION and DECELERATION . . Cutler-Hammer Bulletin No. 14115 provides 5-point inductive time limit acceleration in the hoisting direction for smooth swift take-up of cable slack, equally smooth acceleration and hoisting of loads with a choice of five speeds. Bulletin 14115 also provides inductive time limit acceleration and deceleration in the lowering direction for full speed and safety in lowering all loads and high speed lowering of the empty hook. It provides off-position dynamic braking to assist magnetic brake in stopping the load. It prevents excessive current peaks. It employs dependable constant timing LTI contactors which have a coarse and micrometer timing adjustment, not affected by dust and dirt. It is simple, always provides smooth, uniform response to the master, and is trouble-free. Inductive time limit control is another Cutler-Hammer "original' which has been copied but never equalled.

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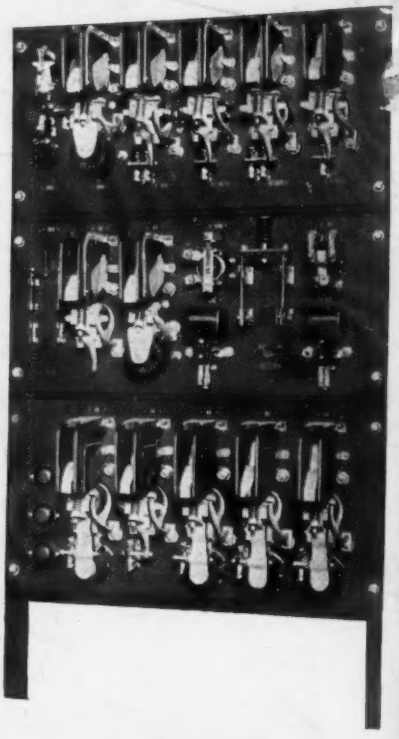

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